DOCUMENT RESUME

ED 030 716 VT 008 444

Seminar in Visual Communication.
Western Washington State Coll., Bellingham.
Spons Agency-Ford Foundation, New York, N.Y.
Pub Date 66
Note-324p.
EDRS Price MF-$1.25 HC-$16.30
Descriptors-*Commercial Art, *Communication Problems, Communication Skills, Designers, *Design Needs, *Graphic Arts, Information Theory, Summer Programs, *Teacher Education
Identifiers-*Project Visual Communication Education

Teachers involved in the Visual Communication Education project attended a summer program in 1966 at which the following edited lectures were made by resource people who represented diverse points of view: (1) "The Design and Technical Foundations of Visual Communication" by Kenneth G. Scheid examines supply and deman, technological developments, design issues, systems analysis, and the development of human resources relative to visual communications, (2) "Psychology of Communication" by Martin Krampen synthesizes psychological and design theory and research for visual communications, (3) "Conversations on Communication" by Judith Ransom Miller relates several common communication problems, (4) "Graphic Communication and the Graphic Designer" by Bill Tara discusses the role and contributions of such designers, (5) "Visual Communication Technology" by Donald Byers describes modern graphic reproduction processes, and (6) "Consultation" by Vernon Welsh discusses tenets of advertising and industrial communication. A related document is VT 005 069. (EM)

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

# SEMINAR
# IN
# VISUAL COMMUNICATION

## Ford Foundation Project

VT008444

3 WESTERN WASHINGTON STATE COLLEGE
BELLINGHAM, WASHINGTON
SUMMER SESSION 1966

# FOREWORD

An important premise of the VICOED* programs is that the emerging graphic arts and visual communication technology will require future personnel to have a broader background of preparation in the natural sciences, the social sciences, the humanities, and communication skills, in addition to graphic design, electronics, photography, and graphic arts. This background is especially important for the teacher of visual communication.

In conformity with this premise, the teachers involved in the VICOED pilot programs attended the 1966 Summer Session and will also attend the 1967 and 1968 Summer Sessions to take course work in those areas where they have had no previous experience or where they feel a need to update and strengthen their background.

In order to prepare curriculum in visual communication education which will be acceptable in our advancing technological age, there exists a need for teachers to broaden their scope rather than to narrow it. Therefore, during the 1966 Summer Session an attempt was made, through the use of outside resource people, to broaden the education and outlook of the teachers rather than to zero in on a particular target and to study it in depth. These resource people are currently engaged in education, consulting, or supervision in the various areas and many are working in positions involving the frontiers of communications' use and technology.

It is understandable that for many this should prove to be an unnerving and frightening experience. It would require new learning, a change in existing procedures and practices, and in some cases, a relaxing or releasing of areas of influence and seniority. Changing attitudes is a rather difficult and time consuming task and many times must be approached in such a manner that change will come about without an apparent attempt to do so. However, we believe there was much evidence of change in attitudes for those attending the seminars, but the major task of changing the attitudes of the nation still lies before us.

The lectures were taped, transcribed, then edited by the lecturers and appear in this volume. They are presented by the VICOED Project in the hope that they will provide a valuable resource for the reader.

*VICOED (Visual Communication Education) -- a pilot program financed by the Ford Foundation and additional supplementary equipment grants from industry.

## 1966 Summer Session
## SEMINAR PRESENTATIONS

| | |
|---|---|
| THE DESIGN AND TECHNICAL FOUNDATIONS OF VISUAL COMMUNICATION | Kenneth G. Scheid |
| PSYCHOLOGY OF COMMUNICATION | Martin Krampen |
| CONVERSATIONS ON COMMUNICATION | Mrs. Judith Ransom Miller |
| GRAPHIC COMMUNICATION AND THE GRAPHIC DESIGNER | Bill Tara |
| VISUAL COMMUNICATION TECHNOLOGY | Donald Byers |
| *DESIGN FUNDAMENTALS, BUDGETS, AND APPLICATIONS | Stan Hodge |
| *PHOTOGRAPHY AND VISUAL COMMUNICATION | Earl Sundeen |
| CONSULTATION | Vernon Welsh |

*Edited material not available at time of publication.

# THE DESIGN & TECHNOLOGICAL FOUNDATIONS OF VISUAL COMMUNICATION

### by KENNETH G. SCHEID

Kenneth G. Scheid and Associates, Pittsburgh, are consultants in management, economics, education, personnel, design, and graphic arts. Previously Mr. Scheid had been associated with Carnegie Institute of Technology and there planned and coordinated introduction of Carnegie's new program in Graphic Arts Management. He was a Westinghouse Ph.D. Fellow in Industrial Relations and Economics and later was a teaching assistant at that institution. Scheid is a member of many professional organizations and has had numerous articles published in various industry journals on management education, new technology, management science, design education, industry economics, and engineering education.

## INTRODUCTION

The natural, one might say organic, form by which men communicate is not visual. It is oral--a spoken language. And yet it is visual communication--achieved at some added human, materials and capital costs--that through the ages has intrigued our inventors, permitted the growth of our culture, led to the expansion of useful knowledge and the growth of economic and social systems, permitted man to govern themselves or be governed by others, and substantially contributed to the efficient functioning of large scale institutions at a local, regional, national, and international level. The growth of civilization, indeed, was to a very considerable extent paralleled by the development of more efficient means by which men could communicate visually. And we often look in the world of the past for evidence of the level of communications capability when we seek to evaluate ancient, and more recent, civilizations. Moreover, we look for this capability in making judgments today about the level to which nations and societies have risen. One need simply list the landmarks in visual communications technology--the invention of pictographs, the invention of the phonic alphabet, the development of easily handled writing surfaces, the invention of movable type and the printing press... and on through the flood of inventions in the twentieth century to show the impact of these developments on human life where they have been exploited.

My plan in the five lectures will be the following: First, to discuss some very broad questions concerning what I will call the demand for and supply of visual communications services. I will focus primarily, in this first talk, on questions of the demand--the economic and social demand--for visual communications in society. Then in the subsequent four lectures, I will consider some important questions that are really basically concerned with society's ability to supply its visual communication requirements. In this regard, the second lecture will present some concepts with respect to technological foundations or technological developments that impinge on our ability to communicate visually. In the third lecture, I shall talk about some of the developments and some of the issues that arise in the design of visual communications--indeed, in solving, really, the problem of communications effectiveness. Thereafter, in the fourth lecture I shall introduce, because of its rising importance, the concept of systems--systems analysis in visual communication. In this connection, I think it will be quite clear as soon as we begin to talk about systems, and particularly about alternative systems of communicating visually--as an example the alternatives that one may face among employing conventional print, electronic media or film to communicate--that the issue of resource use and allocation arises. How indeed is communication achieved most effectively, by means of choices that are made among alternative systems? This is a question of the allocation of both human and capital resources. And then fifthly, I shall come to that issue which all of us as educators find most professionally significant, and that is the question of developing the human resources that are required in the visual communications area. That is the purpose of this Ford Foundation Project: The development of human resources that can provide the professional visual communications services our society requires.

## SOCIAL AND ECONOMIC DETERMINANTS OF THE ROLE OF VISUAL COMMUNICATIONS

### Introduction - Demand and Supply

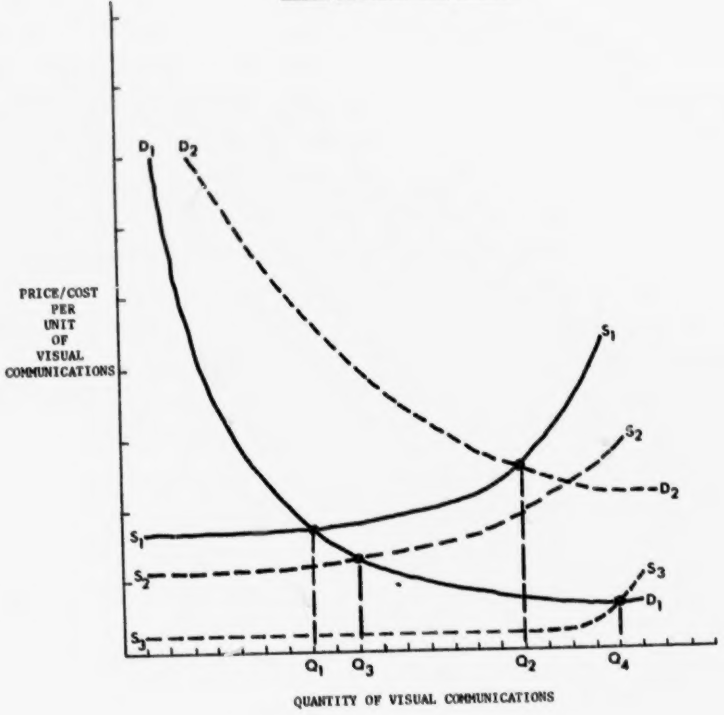
What are the basic determinants of the social and economic role of communications, more particularly visual communications, in modern society?

A very simple model can help to explain the level of visual communications activity and its role in social and economic systems. It is a supply and demand model that can be shown in visual form as a supply and demand graph. (See Figure 1.) It shows, first, how the amount of visual communications services demanded will vary with respect to the price of these services. For example, if the price of a unit of communications service is high, the quantity that will actually be demanded is likely to be relatively little. As the price falls, the amount will increase. An interesting question is the rate at which this increase occurs with respect to price paid. It is quite evident that we are dealing with a downward sloping demand curve; most economic demand is of this nature. (See $D_1$-$D_1$) So we know that the demand for these services will continue to increase as price is brought down, and a principal concern of these lectures is with the factors that do bring the effective price of communication down.

But demand is only half of the equation, because at the same time we want to know something about the supply of such service. And the supply curve runs in the opposite direction. That is, at any given point of time, the cost per unit of communications services will often rise beyond some quantity level, since the price of resources used may be bid up and the efficiency of production may fall. Thus a supply curve will typically turn upward as shown. (See $S_1$-$S_1$)

The value of this little diagram begins to show up when we ask such questions as this: What would happen if a society were to experience a substantial increase in income per capita? What you would expect to find is that the demand for communications services is very likely to rise. For example, one would expect to see the consumption of trade books, of motion pictures, and so on increase. Graphically, the demand curve will shift and also tip. (See $D_2$-$D_2$) If you then assume the same technology, that is the same

FIGURE I
DEMAND FOR AND SUPPLY OF
VISUAL COMMUNICATIONS SERVICES



supply curve, then you see what increase in visual communications has actually occurred. (See $Q_2$) This is a basic concept: that of demand shifts. Likewise, if we invent more effective means of communicating--means that are more economical of resources--and thus draw down costs, then we would show such a supply shift by indicating that for any given quantity of communication the supply price has fallen, and the actual amount of communication increases. (See $S_2$- $S_2$ and $Q_3$) What we are able to do with this little diagram is to show that shifts in such factors as income can shift the demand for communications service, that shifts in technology or other forces can drive down costs and shift the supply curve. In either instance, the quantity of communication rises.

Many such shifts have occurred recently in the demand for and supply of visual communications services. Here is a recent news report with respect to the printing and publishing industries:

> "New York - Reports from the printing and publishing industries indicate an 'information explosion,' a mounting demand for the printed word. Increased volume of orders, logjams in production and delivery, have been attributed by various sources to the rapid gain in population, a general rise in the level of education, effects of the Elementary and Secondary Education Act of 1965, plus the revision of old books and publication of new ones to handle the continuous flow of new knowledge. Commerce Department sources anticipate a climb in book sales to the $2.3 billion mark this year. In the past ten years, dollar sales for books have risen to $2 billion, doubling

> in volume. Unit sales in that period have risen by 1/3 to a total of 1.2 billion books per year. As a result book manufacturers are straining to get new facilities into production. R. R. Donnelley and Sons will spend more than $65 million this year to conclude a three-year expansion program. Only $38 million was expended in the previous three years. Effects of the boom have been felt by manufacturers of printing presses and papers. Management in a large press manufacturing concern expects a 50% gain in sales this year for its large web and sheet-fed offset presses. Delivery on some models will run four or five months behind normal schedule. Spokesmen for a leading paper mill report that its machines are running at full capacity producing book-quality papers."

From this report, one can see what is occurring. There are shifts in demand, the consequence of rising public income committed to the purchase of educational communications materials--textbooks in particular. In response industrial suppliers have also made investments that tend, at least after some time, to bring down the cost of this material. One reason, of course, is that included in this new capital investment is improved technology. In the short run, however, the price may rise. It rises because producers are operating at capacity; they are taxing, in the short run, their existing production facilities.

Let us take some other examples from the 1963 Census of Manufacturers to indicate shifts in the demand for printed communication. Value added by manufacture for American newspapers in 1939 was $673 million. By 1963, it is estimated $3 billion 156 million. This is for the newspaper field that some had thought was going to be rather badly harmed by the introduction of a substitute method of visual communication--television. For book publishing and printing, value added by manufacture in 1939 was $103 million, in 1963, $985 million. For commercial printing, a field which does not, as book printing, relate so much to educational demand, but rather to the demand for advertising and for internal and other forms of corporate and institutional communication, the same sort of increase has occurred. For the five years from 1958 to 1963, for example, in the field of lithographic printing (which has also been a technologically advancing field) the value of receipts, that is sales, rose from $1 billion 366 million to over $2 billion. These figures suggest quite clearly the sorts of trends that we are encountering in only one field--printed communication. Here are some further facts. In 1939, aggregate circulation of American newspapers was about 96 million per issue; in 1958, 136 million. In 1939, there were 239 million copies per issue for all the periodicals produced; in 1958, 392 million. In the same period the number of individual publications decreased, but obviously the average circulation per publication increased substantially. In 1939 there were no television stations except for a couple of experimentals; in 1963 there were 545 stations, and that number has increased considerably since then. In book publishing, looking at two years, 1947 and 1958, the total of new issues in this country had doubled from 11 thousand to 22 thousand. Here are a few figures that indicate the growth in the use of various communications media for advertising. These are index numbers that give an idea of the increase in consumption of these services in recent years. The two years involved are 1940 and 1962; the media involved are magazines, TV, newspapers, outdoor advertising and business papers. The magazine advertising index stood at 24 in 1940 and was at 119 in 1962, virtually a fivefold increase. TV, of course, was zero, and based on a scale of 100 in 1957, it stood at 118 in 1962. Newspapers, from 20, as the index of advertising lineage, to 102; outdoor advertising, from 25 to 88; business papers from 14 to 108, a tremendous increase.

## Demand Analysis

These, then, are the sorts of demand shifts that we are encountering. Let us now turn to an explanation of why this has occurred. To begin one needs to identify why it is that visual communication is a highly valued service in modern society. For it is a service for which our demand continues to grow. Apparently there are additional utilities that we secure from additional communication, and these are simply quite high. (There are some things, food for example, the demand for which is relatively stable; we can consume only so many calories.) But it turns out that society as a whole just has a tremendous capacity for consuming additional communication services; which is to say that although society as a whole always has a limited amount of resources, it is prepared to commit these resources to generating additional visual communications services.

For what purposes? The educational system is a tremendous user of visual communications services, and not only of books, but of other new media now entering. The advertising system which we might better call the marketing or market communications system, is a tremendous user of such services. In recreation, the use of TV is obvious; magazines and newspapers serve leisure time or recreational requirements. Cultural demand is strong. Occupational requirements for professional and technical knowledge grow rapidly. Organizations are great consumers of visual communication; we have a paperwork world. Another use is not conventionally included. This is the development of sign systems in an urban society--our highway signs, our shopping signs; indeed, all about us as we move from place to place are sign systems--means of communicating visually. These, too, are further examples of this growing demand. Indeed, Fritz Machlup of Princeton, in his recent study The Production and Distribution of Knowledge in the United States, analyzes the information generating and the information dissemination industry, and to a considerable extent he is describing the growth of visual information flows in the United States. His estimate is that as much as a third of our total national economic activity could be counted as knowledge and communications activity.

Why is it that visual forms, as opposed to others, have such utility that people are willing to pay a price for this service and are willing to invest in further service and to invest substantially in trying to improve it? As far back as we can trace, the visual form has been a very economical manner in which to record information, whether it be scratched on a rock, printed on a piece of paper, stored on a piece of film, or stored electronically in a computer. The more conventional forms such as print or photography are very, very efficient methods by which to record information, as opposed, for example, to other means, such as recording orally. Visual record keeping is not simply a relatively efficient method by which information can be stored; perhaps more importantly, considering visual communication in an information analysis framework, it provides, most of the time at least, a very effective means of retrieving the information. We can go to the file; we can go to the book shelf; we can pick up something and read it, then set it aside for instant retrieval. It's easy to handle; it's easily accessible. There are exceptions and we are concerned with them, but it is a relatively costless method of retrieval, by and large. Additionally, it provides an excellent way of displaying information. This is especially true of print, a little bit less so of photography; but print just gives us an effective display--an interface--between the information and the man. Contrast, for example, the display characteristics of print with those of computerized systems. The problem of computer display is the problem of providing one typically with some sort of television-like console, and one needs to position himself in front of this console which is not to be moved around at will. For certain purposes this is fine; but I don't want to take my console home from the office each night in order to engage in knowledge acquisition. For this purpose I put a file or a book in my brief case. Thus, as we begin to see alternative systems of visual communication emerge we can begin analytically to define the relative advantages both of the newer and the more conventional systems. For example, for certain display purposes obviously motion pictures or TV have great value. The display on the home TV screen is hard to beat for many uses. For special-purpose or special-interest audiences, the display of information on a screen in an auditorium by means of a film projector is also hard to beat. It is a lot easier for us to do this than to pass out a hundred printed copies for an audience to sit and read.

Additionally, and this is true of all these systems but especially of print, is the capability to recall. Orally communicated information tends to be rather ephemeral. You get it at one given point in time; this is sometimes obviously true of electronically-communicated information that you have at one point in time in your home. But print information, in particular, and film and photographic information, secondly, have this capability to be recalled. I can put the book aside and then bring it back when I want it; it is available to me very, very quickly and at very little, if any, additional cost.

One or two further points in this brief analysis of the technical advantages that create the demand for visual communication: first, the visual form also has a capability to work in a number of different combinations. For example, we can combine verbal and non-verbal pictorial messages in a convenient single sheet or book. We can do this especially well with the printed form. Some of the other visual media are perhaps less well adapted to this combination. That is, do not think of TV or of motion picture film primarily in terms of the communication of verbal symbols but rather of non-verbal, with spoken, oral language. But they, of course, have capabilities that we do not have with print. These systems of visual communication can work in combination with other forms, particularly the oral form. Many of the new developments are taking advantage of the ability to communicate both orally and visually at the same time. Finally, a last point is that visual communications forms, not only print, have the ability to serve large masses efficiently. Thus we distinguish between my ability to communicate orally with you here, and the ability to put what I say into visual printed form and communicate it to others at other places and other times, repeated without costs of my time.

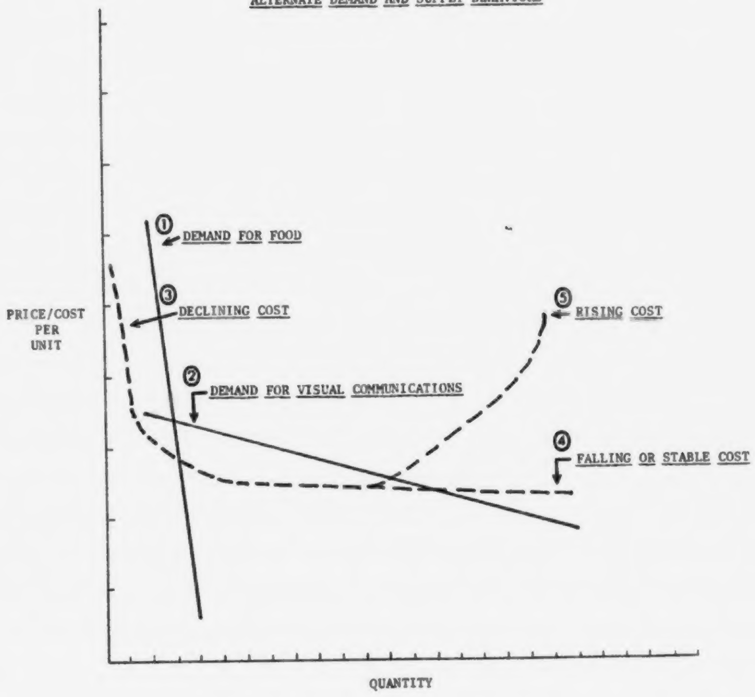
An interesting side issue related to visual communication is the question of literacy. With printed communication, it was always required that the recipient be "literate"--be able to read. Literacy still has tremendous importance, and we can ill afford to have non-literate societies. But some of the new forms of visual communication have indeed by-passed this requirement. TV and film as opposed to the book can be very effective in a conventionally illiterate society. We may therefore need to develop some new definitions of literacy that identify the "receptor" skills needed for effective communication of relatively complex political concepts, for example, in a society where most of the population is not conventionally literate. These skills would not relate to books, but to other media, primarily visual, such as film and TV.

In the section above I have outlined some specifications or utilities that one would prescribe for systems of visual communications. These are not the full specifications, and it would be interesting to develop a set that would be in a sense ideal or optimal for any particular system of visual communication, or for many systems serving many purposes. In any event, it is because the systems that have actually emerged are indeed able to meet so many of these specifications so well that the use of visual communications services has been growing vastly. If we had only the pencil and paper for purposes of visual communications, we would have to solve our problems in other ways. But the vast demand for visual communication arises from the fact (1) that there is additional utility from additional communications services; therefore society, at the right price, will employ more and more of these for many economic, educational, cultural, and other purposes; (2) that visual forms of communication meet many of the important communications, or informational, specifications; (3) that at least some of these forms can by-pass the requirement for literacy, or at least permit various degrees of literacy; even in this country those who are barely literate can be communicated with effectively by other visual means.

What emerges regarding the economics of visual communications is this: Suppose that there could be only two possibilities with respect to the way in which the quantity of communications services that a society employs would vary with its price or cost to the user. One would be that if the price fell the quantity that would be demanded would not increase very much. One can think of services and commodities that our society uses in which this is indeed the case. Food consumption is not going to be vastly increased simply by virtue of a decline in the price of food. (See 1 in Figure 2) We will utilize the savings for other sorts of consumption. The other possibility would be for the quantity demanded to increase very substantially. Visual communications, I believe, presents this total demand picture. To say exactly what it looks like is more of a problem, but a decrease in the price or cost to the user--the user may be you, it may be your school, it may be an industry, etc.--is going to result in substantial increases in the quantity consumed. (See 2 in Figure 2) (Below we will try to see if the price has been falling. Has this service been available at the cost to society of fewer resources? Indeed it has been.)

These two demand extremes do make the point that there are some services in society for which the increase in quantity is relatively insignificant for important falls in the price. Not so with communications. This is one

FIGURE 2
ALTERNATE DEMAND AND SUPPLY BEHAVIORS



in which we get major increases. My remarks concerning demand have been primarily about the United States, Canada and other advanced societies. The question now can be raised about the rest of the world. What is the nature of the demand for visual communications services in the balance of the world? Without going into detail we could argue that if there is value to us in additional communication, then in the balance of the world that value is even greater. In the development of nations, what is one of the major investments? It is an investment in education, and in other forms of communications. This educational investment includes a substantial amount that is visual, namely the purchase of books, films, and so on. These are efficient means of helping to educate masses of people. One is also impressed with the growth in these nations of news media. These can constitute a free press, or a controlled press, but nevertheless they are required. One is impressed with the demand for recreational and cultural communication of a visual type. Thus what we are describing here is a world-wide expansion in demand. It can be traced back for many centuries, but it really has accelerated in the twentieth century. It is an important area of investment in the developing nations, and this is what we would expect, because information, and more information, is valuable.

## Supply Analysis

Let us now consider the behavior of the supply function--the cost in a way--of these services. We can again consider two extreme possibilities in the relationship between unit cost and the quantity of communications services provided. In all systems we would encounter the following sort of cost behavior: if the quantity involved is relatively small, we would expect to find high unit costs. An example of this would be if you have a printing press, and you are only going to print a few copies, the cost per unit is likely to be quite high. Likewise, if you are operating a television station, and you are only on the air two hours a day, that is going to be a very expensive two hours of air time. So, what we are saying is that the unit costs are typically going to fall when output volume rises. (See 3 in Figure 2) Now the further alternatives are: do these costs continue to fall, or hold constant, as units of communications increase, (See 4 in Figure 2) or do they rise again beyond some low point? (See 5 in Figure 2) The latter is certainly possible in the short run. The other possibility seems in most instances to be the more likely situation, especially in a little longer run. What this suggests is that mass communication can be relatively inexpensive, both because we do take advantage of economies of scale and because these economies continue over large output ranges. Thus we can also provide increasing amounts of information at little or no increase in unit cost. This is important, because as the demand for communication rises, we are not going to experience major changes in the unit cost, even if technology does not improve. There are cases, of course, where costs will rise.

Suppose, for example, that the supply of printing paper were relatively inelastic; that is, it could not be expanded very rapidly. Then as the demand for printed books rose, we might encounter a shortage of paper, and publishers and printers would bid up the price. We would find that the cost of communication in the form of books had risen. This is not typically the case. Consequently, costs can be very high, in some relative sense, when communication of few messages to few people is required, but the cost will fall and not rise thereafter across a wide quantity of communications.

More important than this cost pattern--which is sort of a snap-shop--a given point in time--is the impact of new technology on costs. What has been the major factor, in addition to the rising demand for such services, that has increased consumption? It has been technological change. The classic use occurred about 500 years ago. The development of movable type and the printing press in Western Europe just simply changed the whole pattern of consumption of visual communications services. Before that the book was in rare supply. It had to be hand done. Therefore, the ability to communicate through books in society was quite limited. After Gutenberg, as this invention was diffused across Western Europe, there was a quite different situation. Printed communication--visual communication--became feasible. The reason was that the cost per unit fell drastically, and, therefore, people were indeed able to utilize more of that service. The intersection of the supply and demand functions moved far to the right and downward from where it had been when books were hand-lettered. (See Figure 1, $Q_1$ vs. $Q_4$) And if we trace what has occurred over the past 500 years (or the past year), what we see is that technological developments have permitted communications to occur at far lower costs. A recent classic case is TV. For some communications purposes it is simple a far lower unit-cost (as well as faster) means of reaching masses of people than print. The Xerox machine has been a tremendous innovation in the office; count in consequence how many additional copies are produced each day or year. The reason is that their unit cost is very low--very low compared to the cost of communicating by other copying means, particularly the carbon copy process, that were previously available. These innovations all opened up--that is, made economically and technically feasible completely new uses of communication. For a look to the future, we are on the threshold of revolution today in the field of typesetting, and this revolution is bound to generate substantial increases in printed communication that involves the use of typographic quality.

Even though such possibilities can be anticipated of further cost reduction and even though there have been prior reductions, one might ask if it is now so costly to enter the communications service field that only a few can afford to do so, and in consequence are we really unable to diffuse this service to those points all around society where such service is needed. The answer is that this is not the case. Every office, for example, can afford today to have some sort of copying machine--a printing press. Most everybody in this country acquires a television set, and entry into broadcasting is only restricted legally and technically, not economically. Many offices can go beyond and do work with duplicating machines that turn out hundreds of copies. One can acquire a camera and make a movie inexpensively; the establishment of a movie theater is not a terribly costly investment. In sum, the cost of entry into the communications field--one need not be integrated from the "tree to the printed book"--or some aspect of this field, can be relatively low. Consequently, while there are only four manufacturers of automobiles in the United States, there are, for example, 35 thousand or more manufacturers of commercially-available printed communications services, and there are probably another several hundred thousand of what we would call in-plant, or captive, printed communications facilities. When we turn, of course, to TV, we know that entry has been one of the quite critical questions, but technological change will solve that one, too. Namely, in any community all that we typically now have are three or four television stations. This, too, is likely to increase with CATV and with the exploitation of higher frequency ranges. To say that entry can be relatively easy means that the operation of systems is not limited by restricted monopolistic sources of supply. It should also be noted that this supply can come from a wide size range of firms or institutions providing different services. The R. R. Donnelley Corporation in the book, periodicals, advertising and packaging printing field is, on the one hand, a quarter-billion dollar company, but the "ABC" Duplicating Company in Bellingham is, on the other, probably at best a $25,000 a year company. Each of these can live in the field of visual communications serving particular markets. Donnelley prints _Life_ and _Time_ with millions of copies a week. The Bellingham printer may turn out a thousand copies of a brochure announcing a new program at this College.

The last point regarding the supply of visual communications is that we are also witnessing, particularly in the recent years of the twentieth century, important developments in what one might call substitute visual media. Some of these are obvious--TV; motion pictures--first silent and then sound. But there is also the developing use of photographic techniques, particularly micro-filming, for special purposes, and the rise of new electronic means for storing, retrieving and displaying information. Each creates new uses and also to some extent makes it possible for users of such services to examine alternative systems. For example, one firm has been working on a project that involves dissemination of technical information, and we are investigating alternatives that did not exist five years ago. The information at that time had to be disseminated by print. And maybe it still will be, but we are at least able to conceive of handling this through some relatively different process such as micro-filming. Or we can consider the possibility in this case, of putting the information on computer tape, and then instead of sending books around the country, sending computer tape, with the actual printing occurring at the user's installation where he reads what he wants and in the form he wants by punching a button on a computer. What is now the case is that just as advertisers have for years past examined the choices that they had open to them between various forms of print, as well as TV, this possibility exists for other communication purposes. Educational communication is, indeed, one of the areas that is being opened up by the availability not only of books and motion pictures or other audio-visuals, but additionally now of different sorts of display devices and, indeed, computerized systems. Examples such as this make the point again that technology has brought us substitutes--not just improvements in the cost of producing the old services--but new media that are visual.

## Projections

What are some of the influences that will cause the demand and supply functions in visual communications to change, in the future? The demand for visual communication is obviously going to vary with several economic conditions. One condition is the level of personal income; that is, if the level of income increases per capita, then the amount of communications services consumed will rise. So therefore if we project an income increase from 1966 to the year 2000, then we can be fairly certain that this is going to increase the amount of visual communications consumed, as it will many other services. A second condition derives from the fact that communication is not merely a matter, by any means, of individual consumption. It is like a web that weaves through the entire economic system. What this tells us is that as the level of general economic activity--of gross national product--increases, we would expect an increase in the amount of communications services consumed. Indeed, there has been a fairly close relationship over the years--at least in the field of print communication--between gross national product and the production and consumption of printed matter, much of which, by the way, is not for individual personal consumption but has more direct economic functions. It serves to communicate into the market place through, in general, what we would call advertising. It serves to communicate between elements in the economic system through what one might call business communication.

A third condition is simply the level of population, which we might want to identify by age group or number of families for certain purposes. (Newspaper consumption varies, for example, with number of families.) Thus as population rises we are going to find a rising demand for communications services. Some of the more important variations occur as population mix changes, as in the consumption of newspapers.

Beside economic conditions, there are others, and a most important one is the level of education in a society. The consumption of printed matter, the consumption of certain sorts of motion pictures, and so on rises as the educational level goes up. It is obvious that the amount of printed communication will rise in a country that is becoming literate, because now there is an effective demand since people can indeed read. As the level of education rises in this country or in Canada, from a very high prior level, there is bound also to be an increase in the demand not only for printed communications but perhaps other communications services as well. In part, the cause is the use made of leisure time. The decline in the work week from 60 hours at the beginning of this century to 40 hours or less brings with it an increased demand for this type of leisure-time material in an increasingly educated society. There are also other social or cultural factors that add to the demand for communications, particularly by individual consumers. There are developing interests in an educated society about what happens in the world around it. There are also developing interests, with an educated society, in certain sorts of cultural materials that come in printed or other visual forms.

In general, therefore, we can say that as society's level of income and education increases, social habits develop and social tastes are acquired that increase the amount of communications services that are required.

Finally, political conditions are not absent in this equation, for it is probable that under different sorts of political systems one could have either a great increase in the amount of political communication or a great decrease. In our system, we depend on such institutions as the free press and free publishing systems to provide us with most of our political information. We also depend on a relatively free broadcasting system to provide this. In another political system, one might encounter government control. In some cases a government might restrict information, although this does not typically seem to be the case in a large, modern society. Even the non-democratic society seems to be politically as much in need of communication of political beliefs--of political views--as is necessary in an open society requiring an informed and democratic electorate.

Among all these conditions, the major ones are economic and educational. If one takes a look at these two variables, one can begin to make some projections about the size of the market in the future. But we are also concerned with the supply side of the equation. Not only need we project demand changes but we also need to predict what will happen to supply costs and this is harder to do. If there were to be a stable technology because you do not have new developments, or the rate of development is relatively slow, then you are not going to have such a great increase in the communications system. On the other hand, new and major changes may occur, such as the linotype machine at the end of the 19th century that simply multiplied the consumption of print. It did so by reducing the cost of setting information in printed form. Developments of this sort--sudden major developments or the slow process that after a period takes the form of a major development--are what will bring down the costs or increase the usefulness of these communications services, and it is just not easy to predict. Although, therefore, I can tell you quite surely what the likely level of consumption of newspapers or magazines is going to be in ten years or fifteen years, I cannot tell you more than five years ahead what the best form of technology is going to be by which these will be produced, and what the unit costs will be.

To use a concrete example of relationship between some of these factors and the predicted growth of visual communications, let us examine the demand for newspapers in the U.S. What is the relationship between the population in the U.S. in the age group 21 or over and the number of newspapers consumed in the U.S. daily? On a chart you would see almost a straight line relationship between newspaper consumption and the growth of that population group. What is the relationship between newspaper advertising in lineage or in number of pages and gross national product? Here again there is a fairly direct relationship between the rise in gross national product and the rise in the amount of newspaper advertising lineage. And one can see this again in terms of consumption of newsprint as against gross national product; thus, if I can predict gross national product I can predict, within some range, what will be the consumption of newsprint.

As one goes into these analyses in further detail it is basically a matter of trying to find correlations between the underlying factors and the demand for the particular type of communication that one is studying. It is comparatively easy to work out projections of demand changes, and we know that these are going to be mostly increases in the years ahead. But, it is less easy--far less easy--to predict, in a sense, when the Gutenberg or the George Eastman of the 1970's or the 1980's is going to come along. It is very difficult to look ahead technically for more than perhaps five years.

## Conclusion

In conclusion, there may be a new consideration that will limit the continued growth in communication. It is simply that in the last analysis we are concerned with human recipients of all this information, and the human system has a limited capacity to absorb visual information. The question then becomes how much can it absorb? Perhaps for the general public this is no real problem, but for those who are engaged in business, or the professions, or government, it is a problem. This problem of the explosion of information in the area of occupationally useful knowledge is just one that we are not yet able to solve. Old systems may probably be of decreasing rather than increasing utility to us. So the marginal utility is really negative. Additional communication may not help us. It may indeed reduce the value of everything that has come before. Thus how do we find ways of communicating the information more effectively? Our concern may therefore be to design the information more effectively, select it more effectively, retrieve it more rapidly, make it more personal rather than only format it for large masses, and so on. In short, there are some areas of communication in which one may have a problem that really arises out of the fact that human factors are at work, and the human factors problem is simply a limitation on the information processing capacity of the brain.

So, in making projections for the future, certainly we can project growth, but there may be human limits. Otherwise, we can probably say that those nations where incomes or other factors are likely to show the fastest relative change are also going to get the fastest rate of growth in the demand for communication. Under-developed countries are just simply going to invest heavily, primarily for purposes of economic development but for other reasons, too. Thus, while the United States and other western nations now have most of the television stations, printing presses, etc., in the world, one would expect that this will not be the case in the future; the rest of the world is going to be in the process of catching up. And so if we look at world-wide demand, what we are going to see is not just an ordinary expansion but more of an explosion in the quantity of visual and other communications that society employs.

# THE TECHNOLOGICAL FOUNDATIONS OF VISUAL COMMUNICATIONS

## Introduction

The change in the technology of visual communications is certainly one of the most significant observations that one can make about this field. From the point of view of economic effect, namely the effect on the cost at which communications services are provided, one can see a steady stream of developments that have made communications either less costly or more effective for the same cost, or in some cases have speeded up the entire process. In this discussion I shall first describe a broad instance in the development and application of new technology to visual communications. Then I shall turn to some more general issues with regard to technological foundations of visual communications.

Let us examine some new technological developments in printing systems. The problem here is to improve printed communication and the main impact on printing systems in this particular case comes from the development and use of the digital computer. But to understand the applications of computers, let us first investigate some more general considerations with respect to printing systems.

## Printing Systems

The production of printed communication with modern technology can occur by means of an ever-widening variety of systems. The most familiar one for capturing information in printed form is the typewriter, and the carbon copy process is a very efficient means of producing a limited number of useable duplicates simultaneously. Another common system is the camera, especially for capturing non-verbal information, and photographic printing is a very efficient method of securing a limited number of duplicates provided that these copies are not wanted instantaneously. A third familar system is the printing press--ranging in scale from the office duplicator to massive newspaper and magazine units--that permits virtually unlimited numbers of ink-on-paper copies to be produced rapidly and at low cost.

Selection of the most satisfactory system for a particular communications purpose and audience size, at any given stage of technological development, involves consideration of three major requirements:

1. Unit cost
2. Communications speed
3. Communications effectiveness

There is usually a trade-off among these factors. For example, the letter that I write to you will generally best be printed in my office on a typewriter, at a unit cost of a dollar or two, in about fifteen minutes, with the design effectiveness that an individually-typed communication permits. However, when you want to copy my letter you will probably not type it but run it through a copying machine at a 10 cent cost in less than a minute, because the communications effectiveness is entirely adequate compared to the cost of copy typing. I might be willing to pay slightly more for a graphically more effective result, and thus, for example, a wide market has developed for the executive typewriter that gives blacker, sharper, and proportionally-spaced letter images. But no one is very likely to use a hot metal or photographic typesetter to produce this letter, regardless of the quality of the result.

If I wanted to write my letter to many persons, then I would face the choice of typing each letter individually, duplicating an original and inserting personalizing information, or typing automatically except for the manual insertion of the personalized material. The number involved, the unit equipment and labor costs, the time required, and the effectiveness of each result would govern my choice.

Now suppose that instead of a letter I have a lengthy document that I wish to communicate to a large audience, and it includes photographs and drawings, some in color. An efficient system for making thousands of copies would be offset lithography, or possibly gravure or letterpress printing. Here it is probable that the type would be set on a hot metal or filmsetting machine. First, the level of graphic effectiveness is highest; second, the systems cost is low because the process permits the recording of far more legible information in a given area and thus economizes on paper, press time, binding time, and mailing cost; third, if relief plates are to be used for printing, then hot metal will give a three-dimensional image directly; last, despite a higher initial cost, the unit cost is only slightly greater when spread over thousands of copies.

This example can be matched by numerous others. Cost, speed, and graphic effectiveness trade-offs govern the design and selection of systems for printing newspapers, journals and magazines of various circulations, advertising requirements and schedules; for printing various categories and quantities of books at different market price levels; for printing paper, film, and metal packages; for printing buiiness forms; for printing advertising materials, etc. One relatively new systems problem is the production of masses of printed output from computers.

Relatively rapid technological developments have created a much wider opportunity for improvements in the cost, speed, or graphic effectiveness of printed communications. Some of the more important of these include the tape punching typewriter, the magnetic or optical scanner, the tape driven typewriter or typesetter, the high-speed chain printer, the high-speed plate, the paper offset plate, the offset duplicator, the electrostatic duplicator, the color separation scanner, and the web offset press, plus a whole series of improvements in paper, inks, and other materials used in printing. The problem of printing systems selection is to integrate individual technological developments into a process that begins with information in raw form and ends with the ultimate user.

The Computer as Printer

Because that part of a printing system that precedes the production of multiple copies on a press is to a considerable extent an information storage, processing and conversion function, the computer becomes a possible new source for cost reduction, increased speed, or improved graphic effectiveness. What are some of the functions that computers have performed in printing systems?

1. Information Recording: By means of keyboard-punched paper or magnetic tape or on-line keyboarding, and also by punched cards or optically-scanned typescript, natural text,as well as numeric data, can be stored in the computer for subsequent processing and retrieval. The most widespread systems development to date has been to keyboard early in the editorial-printing cycle by making use of typewriters that simultaneously produce printed proof copy and paper tape or direct on-line signals to the computer. (If the hard copy need not be exact,

various "shorthand" codes for common words and operations can be used to reduce the number of keystrokes required to store the information in the computer.) Where the raw information is in voice form, a stenotype keyboard with punch or signal generating attachment might be used to convert directly to input tape or input signals, but then the computer must have the capability of translating all stenotype codes to natural text, and this requires a dictionary memory that is not yet economically available. Scanners, on the other hand, can read manuscripts typed in pre-selected faces, but their cost is very great and they may only be useful in cases where speed is vital, volume is massive, or the information does not require another keyboarding to be optically read. The advantage of the punched or magnetic tape, or on line process is not only that the added capital cost is relatively low, but that the keyboard can be used to retype edited copy or multiple copies automatically, with operator intervention only where new information is inserted; a new tape or on-line signals are simultaneously produced.

2. Editing: The information stored in the computer can be edited in a number of ways that are economical of keyboarding. Perhaps the most direct approach is to use the original hard copy for making final author's alterations, editorial changes, and proofreading corrections, and then to keyboard only the corrections and merge them in the computer with the original information. Other approaches include the reading of the output of a chain printer (preferably the more expensive upper and lower case printer) and then keyboarding corrections only; reading corrections in by optical scanning; or reading proof on a CRT display and making changes directly with a light pen and keyboard. The most active developments now center around merging of keyboarded corrections marked on hard copy. This editing process can continue through whatever number of revisions is necessary without redundant keyboarding.

3. Reorganization: One of the most valuable functions performed by a computer occurs where information is to be printed in several different forms. For example, an alumni directory may list graduates alphabetically, by class, by location, by type of degree, by occupational group, etc. With the computer there is only one keyboarding for each alumnus, and the various sortings are performed automatically. Bibliographies, indexes, abstract searches, catalogs, and many other reference works can be similarly processed. Where statistical data is to be presented in a variety of ways, recomputations and reorganization can likewise occur.

4. Typography: The best-known

use of the computer in printing is to perform a whole sequence of typographic composition functions that are normally done by keyboard operators, make-up men, layout or paste-up artists, and strippers. One gives the computer a complete set of design instructions covering such matters as line, column, and page measure; type faces and sizes to be used; indents, run-arounds, tabular formats and other variations from straight columnar form; limits in letterspacing, word spacing and line spacing; hyphenation and justification desired, if any; rules concerning paragraph and page endings; position of page numbers and footnotes, etc. The computer makes the necessary calculations, hyphenates words by reference to rules of logic and a stored dictionary of exception words, and organizes the information in such a way that on command a fully programmed paper or magnetic tape is produced to drive a typesetting device. At present the comparative advantage of the computer is greatest for setting columns of straight matter, where a relatively simple program can be employed. Where hyphenation can be designed out of the format, or performed manually by an operator at the computer input/output keyboard or at a CRT display, computer cost is reduced. There are a number of programs that give so-called area makeup, especially for display advertising. Page makeup is less common, but it is likely to grow as the technology of typesetting improves.

5. Typesetting Speed and Versatility: Apart from its high speed in performing the typographic composition functions described above, the computer, as noted earlier, permits a substantial net reduction in the quantity of keystrokes required to produce printed communication, and also speeds up the keystroking rate by eliminating the traditional requirement that the operator make justification and hyphenation decisions as he proceeds. Because keyboarding is the most labor intensive operation in printing, these improvements can make substantial savings possible in total printing costs. In addition, at the output end, the operation of high-speed phototypesetters now reaching the market can only be controlled by a system of electronic circuitry that might be described as a special purpose computer. Not only is speed dependent on such control; their ability to produce a far wider range of type faces than is found in conventional manual machines is the outcome of such electronic circuitry.

6. Non-verbal Images: Where the composition unit is the page and the insertion of film images of photographs, drawings, graphs, paintings, etc. in a separate

hand assembly operation would seriously slow the printing cycle, there is an incentive to have this pictorial matter processed through the computer, halftoned, and placed in position on the page simultaneously with the text matter. No such system is in operation today, but several, for special publishing purposes, are under development, and at least one is being outlined for the production of a completely made-up newspaper page. Also being considered is the linking of an electronic color separation scanner to the system, so that process color negatives could be produced in position also. It is likely, I believe, that this use of the computer will be most important where the non-verbal matter is created in the computer, as could be the case with engineering drawings, charts, graphs, scientific symbols, etc. For simple conversion of pictures and other outside source material to printing form, the computer may not be an economical substitute for existing efficient graphic arts processes.

7. Storage and Revision: The computer offers some interesting economies where subsequent editions of a printed communication are to be published. For example, if a book has been issued with one set of typographic specifications, and later an edition with changed typography is required, there would normally have to be a completely new keyboarding. Not so with the computer, if a tape of the original information has been retained. It is now a matter of processing this information in terms of the revised design and driving a typesetting machine automatically to produce the new typography. Likewise, for many purposes it is not feasible today to avoid a complete re-keyboarding where a revised edition, even in the same format, is to be issued. But with computer storage, we can keyboard only the new material and edit the original information to save the useful keystrokes. Thereafter the computer processes the information typographically and outputs to a typesetting device.

### Printing Systems Evolution

If the balance of printing systems technology were not changing also in important respects, then the prospects for increasing use of computer technology in this field would be far less substantial. But indeed there are such changes occurring, and these add to the increased values of computers that are coming from important reductions in their cost, particularly the result of micro-electronics. These reductions appear in the form of lower-priced general purpose computers, time sharing from large central in-plant computers or from service bureaus, and increasing availability of computer time for printing purposes at low marginal costs on machines that users have initially installed for other purposes. These cost reductions continue to increase the computer's economic advantage over human operators in the performance of typographic composition and other functions.

What are the other technological developments that also add to the growing economic advantage of the computer?

1. Press Systems: All of the most important press speed, cost, and quality improvements involve the use of printing plates or surfaces that are made from images stored on paper or film, not metal. These include the perfection of high-speed web offset printing of newspapers, magazines and books, the development of thin, photochemically prepared letterpress plates, the continued improvement in rotogravure, and the probable emergence of a versatile electrostatic printing technology. For all these processes it is more logical to set the images directly on paper or film, rather than going through a metal casting and subsequent conversion process. Thus metal typography will tend to be replaced by phototypography.

2. Phototypesetting: Moreover, the last year has seen the first real breakthroughs in typesetting speed since the perfection of the linotype machine, and the new devices are all phototypesetters. As an example of the improvement, a manually operated linecaster can set about three characters a second, and if tape driven, about eight at most, with the ability to mix no more than four type faces or sizes. A strike-on machine can operate at about four or five characters a second. New phototypesetters in the same price range as a tape operated linecaster can set twenty or more, in up to 64 faces or sizes, and one machine is now operating that will set up to 650 characters per second, or 80 times faster than tape operated linecasters at perhaps 12 times the cost of such a linecaster. This device can set a full telephone directory page in well under a minute. Devices with faster speeds, capable of replacing the high-speed chain printer for producing computer output based on electronic or film matrix character generation are under development. All th these new devices must be driven by paper or magnetic tape, and their real advantages begin to show when the tape is produced through computer processing. Some must be directly on-line with a computer.

3. Copy Processing and Inputs: The developing use of the computer to edit and reorganize text in the pretypesetting stage, as well as the development of off-line editing typewriters that produce paper tape, add also to the systems value of the computer. Computerization, as we have seen, also encourages the elimination of redundant keyboarding by in-putting to the system early. Moreover, since keyboarding will remain the most expensive operation in the process, the earlier it is done the more likely that it can be performed at lower cost with office typists than at higher cost with production workers in a printing plant. Further, the newer systems will reduce the cost and increase the speed

of making corrections, since they will be made from hard copy at the outset under the more direct control of the publisher, rather than after the information has been typeset and must be galley read, as at present.

Other input processes are also being developed that take advantage of the computer's capabilities. Apart from the optical scanner mentioned earlier, and probably more important, wherever information is already stored on tape it can be accepted directly by the computer for further processing and we thus bypass the keyboard altogether.

## The sale of technology

This presentation about new printing systems related to the computer is intended to give some concrete insights not only into what is happening in one field of visual communications technology, but also into the analysis of such systems generally. In this particular system we began with the raw information and ended up with it ready for the user. More generally we can imagine a variety of communications objectives and a range of possible, alternative systems, and systems components among which one can make selections. The role of new technology is to provide us with visual communications systems having lower unit costs. It may not simply be lower cost per page but perhaps more effective pages for the same cost. Or the cost may not change, but the speed with which the information can be communicated may go up by orders of magnitude. All these are the ways in which new technology can work itself out economically. Economists say these are changes in what is called the production function which is simply a relationship between output of a unit of any goods or service and the amount of capital resources and the amount of labor resources needed to produce it. What is happening, for example, in the system described above is a shift in relative inputs of capital and labor and the technologies embodied in them. The amount of labor resources per unit of output is declining and the amount and technology of capital resources is rising; this is the way most technological change has been effectuated. Change that occurs technologically also often requires improved skills in the human resources and in this respect, of course, it is the educational system not the capital market that brings these skills--this new knowledge--into being in an effective way.

## The source and rate of introduction of new technology

In recent years the sources of capital innovations in visual communications, as well as in other fields, has become more and more institutionalized. By this I mean that the day is not altogether, but substantially, past when a Gutenberg, a Senefelder, a Mergenthaler, or some other lone inventor is likely to come up with a great new development. There are important exceptions to this generalization, but as opposed to past years new developments will more commonly flow from organized research and development activity; and this means organized equipment and materials suppliers and systems developers. It means people in visual communications R and D who may know little or nothing, for example, about conventional printing; they are either getting into the field like RCA with its electronic typesetter, by utilizing their technological know-how to improved conventional operations or they are coming from a different direction by providing new means of visual communication entirely. One would expect that the change in the way in which we innovate will, as in recent years, accelerate the rate of innovation. A list of the latest changes in the field of visual communications can be quite convincing in demonstrating that the rate of change has simply risen substantially. In the field of printing, for example, the changes that have occurred in the last five or ten years alone are probably as dramatic as all of those that occurred from the time of Gutenberg. Almost everything that makes the printing system I described above possible, as a case in point, is basically a development of the recent decade or so. Similar changes in the past might have taken fifty or one hundred years. At the same time, to make this point again, technical innovation does not necessarily mean creating the same communications product or the same effect in a less expensive or a better manner. It may mean introducing a completely new service or product. Thus, when we talk about visual communications we must include the technologies of film, microfilming, and others that have arisen and are now arrayed alongside the older technology of printing. This is not to say that we now have the technology complete. We can certainly predict, without being able to say where they are going to come from, that there are going to be perhaps more interesting innovations ever in the next ten to twenty-five years. Society is just not going to invest in all of this effort in R and D in a number of different fields without having some developments, perhaps as spin-offs that could again change the technological balance or the systems mix in visual communications. In the history of innovations in this field there were four or five of great consequence that occurred before the beginning of this century, and the first was Gutenberg's. The development of power-press equipment in the 19th Century; probably the development of half-tone printing; the development of the linotype machine; and then of course, the development of photography would be included. To these we could add conventional lithography, that is stone lithography, although it took over a century for the offset principle to be added and thus have the process really become economically meaningful. In the twentieth century, the rate of innovation is increasing and instead of measuring what has happened in this field over more than six decades it might be more important now to be sure we know what has happened in the last few days, almost literally. The RCA device was only announced and shown in early June and by the end of this summer there will be other new devices. Thus, innovations that may have taken ten years to occur ten years ago, are coming in now at a rapidly increasing rate. If one wanted to identify the major development of the twentieth century in printing, I would suggest that it is the offset printing process. That is, it was perfected in the twentieth century, and it has expanded to encompass everything from office duplicators to giant magazine and newspaper presses, all of which are turning out tons of printed communication today. Elsewhere, there are the developments in film and motion pictures and the rise of TV. In recent years, among the innovations in the printing field, perhaps the one with the most interesting prospects is electrostatic printing. The Xerox Corporation owes its great growth to its having been wise enough to buy the rights to that process when no one really understood it or thought very much of it. Much the same prospects may exist in more conventional printing. As an example, some people are saying that with a method of outputting type on a cathode ray tube, why not just go directly on to paper by an electrostatic system? And maps are now being printed from microfilm in five colors this way for the U.S. Army; essentially the army is getting instant maps. There is a technological marriage in other words, often with electronics one of the partners. There are also improvements in material science, such as the growth of photographic film technology, of new surfaces on which to print, of paper technology, etc. Some are vastly improved older technologies, such as offset printing technology.

As these new technologies enter, people who have had their experience in television are suggesting another marriage between printing and television to produce a newspaper on demand in the home. Such a system would by-pass the very costly process of getting the newspaper from the printing press to your breakfast table. The way to do it is to print the newspaper in your home rather than in a central printing plant by a combination of typography, electronics, and electrostatics. (The Japanese have done this on a demonstration basis.) Other marriages, say of microfilm and the computer or of high-speed copying and high-speed duplicating systems, are occurring. Thus, when we talk about print or we talk about TV, or we talk about one of the other visual communications methods or media, we are simply talking about one vast set of processes that are becoming intertwined, and potentially much more so.

This is not to say that you will not still be able to get wedding invitations printed down at the corner. These marriages of technologies may often serve new purposes. The purpose that comes to mind immediately is the storage and retrieval of technical and professional information. This is really a new problem. It is not solved simply by the printing of the journals. There is more to it now than that. This is where these technologies begin to merge, to create a new method of recording and dissemination of knowledge.

Technological Disciplines

In summary, the range of disciplines that one would need to identify as important to visual communications today, and in the future, is wide. It is obviously no longer adequate to say of printing, for example, that it is a craft; that it has a history that goes back 500 years; and that the way one learns it is in an apprenticeship fashion because it is a stable subject. It isn't any longer. In that field alone, just as in TV and film, there are contributions from a number of disciplines. These disciplines include mathematics, chemistry, physics, and a number of the conventional and newer engineering fields. Particularly I would include the field of communications science. Communications science or engineering is essential to the field that we are discussing. Moreover, there is the whole question of developing not merely mechanical or electronic devices, but also of learning how to use them. This is the problem of soft wear or systems design, and thus, at a center much as the University of Pittsburgh its R and D effort is not in the development of the hardware but in the development of the technique and the instructions for using the devices. Obviously funding for this type of work is going to arise not only from conventional sources but from directions that we would never expect to see interested a few years ago. As an example, Merganthaler Linotype Company and CBS Laboratories are linked in the development of a phototypesetting device that is financed by the U. S. Governement Printing Office. These are the sorts of efforts that promise to bring a steady stream of technological change in the field.

# DESIGN FOUNDATIONS OF VISUAL COMMUNICATION

Visual communications is to a very considerable extent a problem of design. It is a problem of encoding message with the wide range of choice available, much inventiveness is possible. The planning continues to become more complex as new media emerge; that is, as technology, in a sense, frees the communicator--the communications designer--to make far greater use of his communicating abilities.

Additionally, when we talk about communications design we can never neglect the fact that in the last analysis the question that needs to be raised is how effective is it? That question applies to economic or market communication--that is, advertising or exhibits and so forth; to educational communication--in the form of books or film or other media; to political communication--in the form of political campaign materials, or films, or TV and so on. Does it accomplish its objective?

It is really quite recently, from the point of view of the design world and the design function, that this question has clearly been identified as the central question. Thus, design--communications design--become goal oriented. It is oriented to the achievement of communications objectives. And these objectives may indeed be ones that one can measure, so that there may be feedback that indicates whether or not a particular visual solution has indeed served its purpose.

I have introduced the subject of design in this way because there continues to be some difference of opinion as to what is meant by design and what its role should be. The main conflict has been between those who are concerned with the function of visual communication, and therefore relate the design activity to that, and those who are primarily concerned with something more personal and expressive and thus are concerned more with aesthetics and aesthetic standards --not with the existing standards of the receivers of communication, but with their own. These groups represent primarily the fine arts, and they have argued that design is basically a matter of applied art. I suggest to you that this is not so, without suggesting that our knowledge and our developments in the fine arts--visual arts--have no bearing on visual communications. But it isn't a matter primarily of art; it is a matter primarily of communication.

And so, when we talk about communications design we are talking about something that is indeed substantially different from fine art or applied art. This is to say that the purpose of design is to present information visually--and effectively--whatever the particular objective, be it economic, educational, informational or political. It may be persuasive, on the one hand, or purely informational on the other. These are the objectives that are more and more coming to be central to the work of designers and to the process that we call design.

How did the design function, and the design profession, emerge? If one goes back before the turn of this century, in the visual communications field there were really basically two sorts of individuals who performed the design function. The first of these would have been the rather practical editors and printers who had the problem each day of assembling printed material as an important part of their jobs of getting communication to those for whom it was intended. Thus, from early days there has always been an important role in typography and book design for people whose direct and immediate concerns have been more with the message itself and getting it into form to be distributed. In addition, of course, over the years previous to this century there have been others, basically artists, who illustrated by making woodcuts, engravings, lithographs, and so forth. Toward the beginning of this century further splits emerged. On the one hand, a number of the practical, day-by-day craftsmen began to resist the typographic forms that emphasized decoration as opposed to clear communication or function. This was the beginning of the movement to simplify many products including our visual products, and in these early stages men like William Morris sought to go back to the classic simplicity of type, for example, to get away from all of the decorative tendencies that had emerged. While this was the first approach, within a decade or two, a far stronger movement emerged. It said, first, let design, including communications design, be something independent of art on the one hand, and independent of the technologists on the other hand. Design is a process of creating form--but form for some purpose. Thus there arose such slogans as "Form follows function"; it was indeed the beginning of what we can call today a profession of design. This beginning, in Germany in the Bauhaus, was not without its connections with modern art, because modern artists were at the same time arguing against the same traditions. And in the Bauhaus an effort was made to accept, indeed to adapt to, modern technology. This reaction was quite different from that of the earlier groups which had said, like Morris, "In order to clean up, in order to simplify, in order to communicate more effectively, we should go back to classic form."

The Bauhaus provided a wholly different concept--in architecture, in industrial design, and in graphic design. Moreover, there was an interest not only in print, but in film and in all of the emerging communications media. The history of the Bauhaus, of course, is a history of success and a history of failure and tradgedy. Finally, it was driven out of Germany by Hitler because it argued for a form in communications, products, and architecture that did not comply with his political concept of what design should be. It did not have that classic German grandeur to it. It moved to this country, in part, and established some strength in Chicago that still exists at the Institute of Design of the Illinois Institute of Technology. Thus, in a period of three decades at the start of this century we began to identify a visual design profession. But this was design that related to the technology of industry, and the word industrial design, which broadly means the design of graphic or visual materials as well as other products, was chosen to suggest a link between the technology of industry and the function of design.

There is still some disagreement, some uncertainty, as to really what design is all about. But more and more, at least in the field of communication, a clear emphasis is being placed on function. Indeed there may probably be more acceptance of this today in the field of visual communications than in the field of architecture. That is, from what one reads the suggestion is strong that there are still very many architects who are basically monument builders, who are seeking basically to express themselves. They are obviously going to have to satisfy clients, but there is often a tug-of-war between the architect and the client. This does not represent the field of graphic design today, in part because many people are performing graphic or visual communications design functions who do not by background have the education or the professional training that one typically associates with artists. Printers are still doing much graphic design; people raised in the field of photography are still doing much graphic design; people raised in the field of photography are often doing design without having had a full-blown arts background. Indeed, all of us in some way are designing visually, and most of these efforts are quite functional. They are objectives-oriented.

The emergence of a sharper concept of what design is has been accompanied by a further recognition of what the design *process* is. In particular, graphic design is being increasingly recognized as communications design, which is a complex problem-solving process, but a process that can be quite as rational or orderly as many other processes that are used to solve complex problems. The debate over whether our graphic communications result from flashes of genius and intuition alone, or from hard, disciplined analysis and synthesis, is ending. For example, there is now a rising literature that explores how basically to define a design problem, to develop alternatives, to evaluate these alternatives, and to make choices --perhaps going through this many times --before the final outcome is achieved. In this problem-solving process, there are many opportunities, just as there are, say, in the field of physics, for intuitive approaches. But the important point is that communications design is a problem-solving discipline. It need not, therefore, be mystical. It need not, therefore, be one that cannot be improved by using whatever problem-solving methods and devices we have available to us in the middle of the twentieth century. If, by the way, such approaches as mathematical analysis or the analysis that comes from the social sciences, or the use of computers are useful, these are all within the scope of what I imply by design problem-solving.

What seem to be the major *analytical* areas that can be of assistance in the solution of a design problem, particularly a relatively complex problem? Let me outline five types of analysis and suggest what some of the issues may be. First, the analytical beginnings of design would logically center upon analysis of the objective or purpose. As an example, if the design objective is economical--for instance, there is a market objective involved such as would apply in advertising communications--then one can apply from the field of economics tools that can give some understanding of what sorts of behavioral effects are required. Thus, a piece of communication to individual consumers would probably demand a different visual solution than a piece of communication directed to industrial buyers. To test this difference, pick up a consumer magazine such as *Life* and look at the typical advertising. It will probably, today, utilize a photograph that takes a good part of the total space and the text matter will not be very extensive. It may have a relatively strong emotional appeal; it will not likely be a dry, factual statement. If, on the other hand, you look at *Business Week* or a trade journal in which industrial advertising appears, one would not expect to see the same approach used. This is not to say that photography or non-verbal material will not be shown, but the audience is economically different and one is likely to find far more attention given to factual description, even though the nature of the final objective in both instances is to induce a purchase or consideration of a purchase. (See my article in DESIGN AND PLANNING, edited by Martin Krampen, for a discussion of this point in some detail which suggests the impact of the economic environment on design.)

If the problem is not one of economic or market communication but, for example, educational communication, then you know that in order to design for educational objectives, one had better very much understand something about the learning process. Otherwise, one may come out with a visual result that is simply not related to the sorts of learning processes that are involved. It may be an artistically fine piece of work, but it doesn't serve the objective of learning.

If the objective is the communication of news events, then one can again gain from an analysis of what is involved in that process. I am simply saying to you that design can be analytical, rather than simply intuitive. At Carnegie Tech during the 1964 elections, we dealt, for example, with a problem in political communication. How does visual communication aid in getting a candidate elected? One did not really understand what the communications requirement was until one got into an examination of political decision making by voters. It then became far clearer as to why you would employ certain visual media and forms rather than others. The second, and somewhat related analytical base for communications design (including design for education), is the emerging field of what one might call communications analysis. (See RESEARCH PRINCIPLES AND PRACTICES IN VISUAL COMMUNICATION for some relatively simple models of mass communication.) Those acquainted with the study of journalism are well aware of the increasing emphasis that is being given to communications analysis, as opposed simply to the development of writing technique in this field. Universities such as Stanford, Illinois, and Pennsylvania have redeveloped their programs to orient them around communications analysis. It is for that reason that I suggest examination of Katz and Lazasfeld's PERSONAL INFLUENCE. PERSONAL INFLUENCE is a trail blazer in the field of communications study. It introduces a model that is quite more complex than earlier assumptions that there is a rather direct link between mass media and, in this case, consumer behavior. What Katz and Lazarsfeld found from their field studies was that the link is not direct, in most instances, but rather the process involves influence centers, and these are typically individuals possibly with standing in their small groups--individuals who are regarded well by those to whom the ultimate message is directed. Thus they concluded that mass communication that proceeds directly to a wide audience may not be anywhere near so effective as communication directed first to influence centers that in turn link with mass behavior. This finding has validated one form of advertising that you see--testimonials. Here is an effort to utilize this influence-model approach. There are any number of projects or problems where the model is more complex than a simple sender-receiver one. Take the problem of changing behavior or changing attitudes in the South with respect to race. Suppose you have a lot of money; how would you go about seeking to influence Southern White attitudes with respect to the Negro? A first reaction might be to launch a vast direct communications campaign of some sort. But when we gave this problem to our students, they came up with a different solution. Namely, a very costly campaign might indeed not be required. Rather, mount a campaign first of all to influence the Negro to get out and vote. (First get him registered, of course, and this involves some legislation, etc.). He would then be in a position to influence the behavior of some White politicians in the South, if these White politicians were dependent on him for the winning votes. And since some Southern Whites might indeed look to political leaders as guides to their own beliefs, they might indeed then begin to shift them too.

So this was a far more complex process and you can see that if one were now asking what sort of materials to produce visually, it turns out that they would be of a quite different type, directed not to the White, but to the Negro to secure his political action at the polls.

The use of communications models has been extended to the problem of education--for example among disadvantaged and minority children--for in the learning process it has become important to know what the best communications method is. Thus, there is a second analytical base from which visual communications design ultimately secures helpful clues.

The third area is what one would call human factors. The term human factors has been conventionally used with respect primarily to man-machine systems in the field of industrial and engineering design. But it is just as applicable to the area of visual communication. From the point of view of communication, one is concerned with the human capability to perceive and with the factors that influence perception, including motivational factors. For example, it has been claimed that certain colors are associated with certain emotions or motivations. The question concerns the human system in the visual environment and its limits. As we know from studies that have been made, for example, in aeronautic and space systems, there are limits to the ability of the human sensory and communicative organs to receive information. This shows up elsewhere, too. A good example of this is the problem of traffic signs on a high-speed highway. It is quite clear that very little human factors work has been done in the development of those sign systems. Signs have been installed, for example, that will mislead possibly as many as half of the drivers as to what is the exit and what is the entrance to a high-speed highway. In consequence, there are a number of places around the country where there have been some very serious accidents when someone sought to exit from the expressway at the same time someone was coming in because the sign had been placed in such a way that it does not recognize the limit of human perception involved. There are also problems of legibility. It is taking a long time for designers of sign systems on highways to understand the simple fact that upper and lower case lettering can more readily be seen at a distance than all upper case lettering. A vast number of our signs are still done in all upper case, and in consequence, people see these signs at 70 mph, but they do not get the message in time. These examples suggest the sorts of human factors analyses involved. We can also give the example of aesthetics as a human factor; namely, what is it that does appeal? What is it that does appeal to the individual, and to masses of individuals, regardless of what one would like to have? Aesthetics are, in a sense, a human factor. Perhaps we would prefer that the system--the human system--should behave differently, but if we measure aesthetic taste we at least know that if we do not respond to these in whatever we design, we may have to face lack of acceptance as a consequence. The example, of course, that often comes to mind is in Detroit. In the mid 1950's, automobiles were designed with great tail fins, and most design critics were shocked. This was not a very pleasing thing to them, but whether they liked fins or not, apparently they sold automobiles. Apparently, that is, it pleased the people who were making the decisions. Now, one can say they did not have any other choice. But in fact they did. Because if their market behavior had suggested that they did not like them (at that time), somebody would surely have come forth quickly with a vehicle that did not have tail fins. Thus, human factors analysis includes the question of aesthetic preferences on the part of those to whom one is communicating. Another example is the question of typographic tastes. Most people are relatively conventional when it comes to typographic preference. They typically prefer a balanced page and it is not too likely that the man in the street will prefer what one might call avant-gard typography, although there are sub-sets of men in the street who will prefer this. The important thing is to know which audience one is working with, for we have seen examples of the need to redesign a publication because the audience was misjudged in terms of its aesthetic preference. Another element of human factors has to do with the question of legibility of text. There have been a number of studies made over the years dealing with the readability and legibility of type. The work continues. One of the more interesting recent jobs has been done in Sweden by Bror Zachrisson called Studies in the Legibility of Printed Text. There are no earth-shaking conclusions, but for example, he reports that from the point of view strictly of reading comprehension and reading speed, the rule that one must justify all right-hand margins is not significant. Many persons prefer justified right-hand margins, but controlled psychological experiments have shown that this visual form does not improve the reading effectiveness of the material so designed. In other words, we design with justified right-hand margins for aesthetic, not reading speed, reasons. Another example, an old chestnut in the field of graphic design--serif versus sans serif. The conclusion is that by and large there is no reading speed difference. In other words, the man in the street will prefer the Roman letter for most of his reading matter, but it is not basically because it is easier to read, no more than he prefers tail fins because the car is easier to drive. Thus, in human factors we have another means of analysis that can be employed to study all potential visual communications.

As I turn now to the fourth type of analysis, let me emphasize that it is central. For want of a better word, it can be called basic design analysis. This analysis rests on those not-too-well-established concepts that center around organization of visual form--in a sense on "pure visual art." Included are questions of colors and their relationship, questions of line, questions of texture, etc. To describe this in detail is not my purpose (nor am I qualified to do so), but in DESIGN AND PLANNING by Krampen, one can find material that treats some of these basic design considerations in an analytical way, especially an article by William Huff on symmetry, which of course, is one of the really fundamental considerations in all visual (another useful reference is Josef Albers' INTERACTION OF COLOR) organization of material.

The fifth analytical area was discussed lengthily in the previous lecture--namely the area of technological systems analysis, or if you prefer--media analysis. The significant consideration simply is that today communication can proceed through a number of technological processes or media. One can employ not only a variety of printed forms; one can also employ non-printed forms such as film or TV. Their importance to the solution of a design problem is that some of these forms work well for certain purposes, and others work well for other purposes. Selection is a matter of effectiveness and, of course, costs. So this fifth type of analysis is concerned with what these technologies are, and when the analyst (designer) knows what the various technical-economic possibilities are, then the effects to be obtained from these are examined. In the old days, it was simply the letterpress versus offset type of question. It is just far more involved now. Always there is the question of cost, so ultimately we are talking about an analysis that is technological, that is related to the design effect, and that determines the relative advantage of technical alternatives in terms of cost per unit effective communication.

I hope that this definition of five areas suggest that design is analytical (indeed, scientific) and that there are opportunities in communications design, in each of these areas for much additional research. The research that has been done so far often was not research organized by persons interested *per se* in communications. I think that there is an opportunity for institutions and others now to engage in such research. In conclusion, I suggest that just as we can talk about analysis--the breaking down of the design problem--we can also say some things about synthesis--that is, the more specific need to generate alternative solutions, and select the best. Let me briefly refer to four or five aspects that seem to be of interest. First, it is important to recognize that many visual communications solutions do not spring forth anew each time. The best example of this today is in the field of corporate design, where the firm has established, essentially, a visual communications *policy*--a policy with respect to how it wishes to look. Ideally, such policies are adopted after careful analysis and imply far more than just putting a new design on the top of the letterhead. There is coordination among all--elements in packaging, in exhibit design, in a whole raft of visual materials, and indeed over to the design of products and architecture. Thus, first there is more frequent use of what we can call design policies and the absence of design policy is typically the cause for great outrage, in certain circumstances. The best example occurred at the New York World's Fair. It was absolutely absent of any design coordination or design policy. It was a free for all, and probably some people preferred it that way, but the main complaint was that there was no policy established with respect to design of the structures of the Fair. Nothing seemed to go with anything else. And this, of course, is where the designer is typically seeking to introduce some sort of policy, in the sense of a statement of an objective and a guide for action. In this case, a guide for design, for visual effect. We see policy at work in the fact that magazines do not change their general format from issue to issue although it would be technically quite possible. So there is just a lot of policy---of pre-determined visual form--all about us, and in communication this is quite so. And it seems as though more and more is being so decided. On the other hand, Anthony Mann, in his article on "The Value of Visual Formalism in Design" in DESIGN AND PLANNING, is concerned about the absence of an established formalism--not within a particular organization--but across society, that gives us a way of deciding of what is and what is not well-designed. He points out that in graphic design, for example, in centuries past, there was an established formalism, and if you went to a book designer (or printer) with a manuscript, you could almost predict exactly what the whole thing would look like. Such things as the layout of a title page, the inside pages, etc. were predictable. Today, if you went to have a book designed, you would not know what you were going to get, because today we have essentially far fewer culturally-established policies about design. Mann makes the point that this has been helpful in some ways. It has generated new ideas, but at the same time it has created chaos. I think he would argue that the

New York World's Fair is the consequence of this. In the St. Louis Fair at the turn of the century, there was a formalism. Perhaps we look back and do not particularly like what we see, but there was a formalism--a social policy. In its absence we can get chaos.

The second aspect of design synthesis, as opposed to design analysis, concerns the role of creativity. This is a word that gets attention in all discussions of problem solving, and it is certainly a common one in the world of design. The point is that the role of creativity is becoming better understood, and it is becoming clearer that man--in his intuitive, creative role--can do some things very well, but there are other decisions that are more or less repetitive, or that might be made by the establishment of repetitive processes, for which a creative approach is simply something not very worthwhile either to the individual or to the result. Newell, Simon and Shaw have outlined some ideas about creativity, they make a good distinction between what one might call the well-structured problem and the ill-structured problem. It is the ill-structured problem--that is the one that just does not lend itself totally to step-by-step synthesis--where the opportunity for creativity, for the individual spark of inventiveness, is greatest. Thus, while creativity is part of a design process, it is not the only element, and in some cases it just does not have a valuable bearing on the problem.

The third aspect of design synthesis concerns how choices or decisions are actually made about design. All that I want to say here is that research is now being conducted, although not necessarily in communications or product or architectural design per se, on the analysis of decision making and the development of more efficient methods of making decisions. One aspect is operations research, a method for solving certain sorts of complex problems by which one can seek and possibly find the optimal solution, or the best solution under the conditions, to a particular problem, or is being employed in a number of design-related areas, as for example in selecting advertising media. For some complex communications design decisions, there are going to be some uses of operations research. For example, in the architectural field (and there is no reason why this would not happen in the communications field) some people are writing very interesting computer programs to help--not to make, but to help--make better architectural decisions. Professor Alexander at Berkely has been especially active at this, and his book, NOTES ON THE SYNTHESIS OF FORM, is a good trailblazer in the area.

The fourth point about design as synthesis is that most design occurs in organizations. Consequently, in brief, design is most frequently a team operation. There may not be only a team, but a hierarchy involved. (For some detail, see DESIGN AND PLANNING.) Thus, the design process is not only multi-disciplinary, but it is often a team, as opposed to an individual, process.

The last point that I bring up with respect to design synthesis is that design, like any other important human activity, needs to be evaluated. The result needs to be tested in some way. Educators know that this is a critical aspect in the design of new educational communications. One does not simply assume that learning has occurred. There is some sort of test. And in other visual communications there are methods of testing. One of the most important tests, at least for the many visual communications that have an economic function, occurs in the market place. Did it gain the acceptance intended? If it is a piece of advertising, did it aid in the solution of a selling problem; if it is a book, to what extent did the visual presentation of the book help in its being sold? This design process, thus, does not end with a decision. Rather it is a continuing process of evaluation. The methods of evaluation, by the way, can be laboratory methods in some cases. They can be simulations. They can be field tests or trials, a very common method for visual communications of any significance. Or, again, the method may be simply to put it into the system and see what happens. If it does not perform the job it was supposed to do, then begin to find out what can be done to improve it.

These comments with respect to the process of design--both in its analytical and its synthesis stages--were intended basically to show that there are a variety of foundations for the design of visual communications; that these foundations are ones that have emerged mostly in this century, although not exclusively so; that much is occurring now to make design more analytical, or scientific. Finally, in the field of communications, as in other fields, new technology is one element that keeps shaking up the process. So long as someone may next year come forth with another method of communicating, we cannot ever say that we have solved the problem, that there is a visual solution. New technology may allow us to do something we could not do before, or may make the old solution unworkable. But on the other hand, just think how long it took for us to move in the field of film away from the use of essentially a book format to title our movies. Today most films open up in a quite different way than they did ten years ago, for then it was just as if you had picked up a book and opened it up to the title page. Now we have taken advantage of the technology, so that we often see the first action of the movie before the titles, but it took a long time in coming. Thus, as new technology arises, old design solutions may no longer be best.

## Systems Concepts and Resource Allocation in Visual Communication

The term "system" is used freely and widely in professional discussion today. Education has had the term for many years, and the phrase "educational system" is part of our common vocabulary. In recent years, we have begun to make more effective use of this term and have indeed developed a whole field of what is called systems analysis.

One example of a communication system is a manuscript processing sequence that we could define as beginning with the original preparation of the manuscript by the writer, including the storage of this information on a piece of paper followed by the revision of this information either by the writer or the editor, and then the regeneration of this information in corrected form; and if that is the end of the cycle, its outputting perhaps to some subsequent stage, such as a printing system. Or one could talk about a typesetting system, indeed a whole range of typesetting systems. A conventional one would begin with a manuscript received in a printing plant where key-boarding occurs. The other end of the keyboard machine produces metal images that we call metal type. In turn, these images are transferred by a proofing process onto a piece of paper. This piece of paper cycles back to proofreaders, to editors, etc.; corrections are made; the process then in a sense, recycles through the keyboard and ultimately something is outputted to the next stage. One could talk about printing systems in the sense of reproduction or duplicating systems, beginning with an image which might be typographic or pictorial. They would follow the conversion of this image by means of mechanical or electro-mechanical processes such as electrotyping, or by photo-chemical processes as is the case of the process by which an offset printing plate is made. In turn, this image passes into a printing press and on to an image carrier, and so on through the production of the completed object. One could speak about a drafting system in which the engineer brings certain information inputs to the draftsman who proceeds through a set of steps and in turn produces a drawing that is reviewed by the engineer who makes corrections; these are processed and ultimately the drawing is outputted to some further stage. One could talk obviously about television communications systems. There are specific teaching systems and sub-systems.

The point is that the word is beginning to have more meaning than simply describing a collection of activities. A system is (1) a linkage of (2) operations, processes, or components that (3) converts (4) one or more inputs into (5) one or more desired outputs and (6) contains a means for adjusting the inputs and processes if the desired outputs are not being obtained. I have sought in this definition to identify the object of the system--that is, that there are one or more wanted outputs; secondly, to identify the fact that the system begins with some sort of input; thirdly, to indicate that there are components or operations or processes that are linked. One might add that an interesting aspect of systems analysis is the question of the so-called interface--the jointures between the various components in a system. Psychologists and engineers have been using this term very regularly in talking, for example, about problems of educational communications systems. Here one question concerns the interface between the student and the information. A recent educational research report, for example, described a total system but was particularly centered on the link between the student and the information. In this case, the information would, for example, have been stored on film or a TV camera.

The value of this definition of a system is that it permits us to say some useful things about particular systems, to try to measure some aspects of systems behavior, and to introduce the "feedback" concept. Thus we look for some method by which outputs are measured in relation to some established set of criteria and, when a divergence is found, then something is adjusted that changes the inputs or the process so that when we measure again, we have the desired output. (The example that is always used to describe this aspect of a system is the thermostatic control that regulates an air-conditioning or heating unit.) As a concrete example in communications, let us examine an editorial production or copy processing system being developed by one of the country's large publishers. This system begins with an input on the part of the writer. He feeds information in. The information is converted by a keyboard mechanism and an operator into two sub-system outputs--hard copy and electronic signals stored in a computer. And this system has a cycling-back procedure. When the editor wants to call out the information, there is a component of the system, a high-speed printer, that produces unedited copy just as it went into the system from the writer. This in turn can be further processed by proofreaders, copy readers, researchers, and the editors. (Notice that this is a man-machine system. It is not completely automated. The system depends very much on human activity.) In turn, corrections can then be cycled back into the system through the same keyboarding operation. One could thus say that this is a complete system in itself--an editing system in which raw information is the input and the output is information in a new, more usable form that complies with the editorial policy of this particular organization.

Now this system is actually linked to another--a typesetting system, in which the information is called out through a paper tape punch, after it has been processed first with respect to justification and hyphenation. And then there is a data transmission link to a printing plant where a phototypesetting device receives, as input, the output of this paper tape punch, the interface being the paper tape itself. The signals stored on paper tape are then connected into typographic characters that are outputted from the phototypesetter.

One could go on describing the subsequent systems that would lead on to the printing press itself and finally, indeed, show the delivery of the magazine to the home or the news stand.

As another example of the way in which systems thinking is being introduced to many different areas, here is a report from the University of Chicago discussing a National Science Foundation grant for a two-year study of library catalogs of the future: "Viewing the library catalog in its entirety, we ask: What kind of information should the catalog contain and how should this information be organized so that it can respond to the questions that people would really like to ask of it, instead of just those questions to which library catalogs can presently respond? Suppose one were trying to find a particular book in a library without being certain of author, title, or subject, but for some reason did happen to remember that the book was about four years old, that it was very large, contained about 400 pages, and that it had several authors one of whom was named Smith. Few would have the courage to approach present libraries with such fragmentary information, but in principle this ought not to be the case. Future (possibly mechanized) catalogs should have the capability to generate very quickly a list of books meeting all the stated specifications, from which a selection could then be made by the requester. If the list is too long, the library or 'system' should suggest possible criteria for tightening the specifications. People have a propensity for remembering small fragments of information and for being at least initially vague in the specifications that they are able to formulate; with suitable reminders as to the range of possibilities, they are able to do much better. It is our belief that the library of the future should be designed around the frailties of human memory rather than around the notion that people must somehow learn to cope with libraries and with increasingly complex bibliographic tools. It is this belief that motivates our research project on catalogs of the future." Many library groups are at work on this problem of information storage and retrieval, and indeed the work involves the use of some visual communications technology.

MODELS

I have tried to make clear what a system is and why the systems approach is a quite useful means of analysis. Let me now add a few comments about the use of systems models as an aid in analysis. The term "model" often is used in connection with the term "system." A graphical flow-chart representation, typically simplified, is a very common model used to think through the many steps involved in a system. It is not the only technique by any means by which we can model a system. We can model a system. We can model a system mathematically. We can describe, in other words, the state of events now and at some point of time in the future and the difference between the two states is typically described by means of a set of differential equations, difference equations which are more commonly used to solve real systems problems or to describe real systems. In any case, for some systems work, mathematical technique is very useful. But this is not the only additional way. The laboratory gives us a way of modeling a system, by essentially putting one on the bench and trying it out. A number of visual communications systems are just now getting out of the laboratory. They are in the breadboard stage, moving into production. They are laboratory models of what the system could ultimately be.

We then have the concept of the pilot system, and indeed as you know, the project that is under way in Visual Communication Education is a pilot project. It is an effort, in a sense, to create a model--to try out a new system--of education in visual education in visual communications. We can also have a simulation of a system. The simulation technique that I am particularly familiar with is computer simulation. As an example, the Boeing Company is employing a computer to simulate graphically the flight of aircraft. And indeed if you see the films produced by computer graphics, this company has essentially done in the computer what it might otherwise have had to do in the wind tunnel, in simulating flight. There is one additional technique, and this perhaps is the most common--namely, to have an actual field test. This can be the same in some respects as a pilot project or it can differ from a pilot project if pilot work is done in an especially controlled environment. But testing of systems is really a way of making use of a concept of a model. All of these are techniques that can be useful in the solution of problems in visual communication.

SYSTEMS ANALYSIS

Now let us turn to the analysis of systems from the point of view of their usefulness. Here we accept the fact of technical feasibility; that is, engineers in particular can do today many, many things if you give them enough money and enough hardware. We all have seen technically conceivable systems in the field of visual communications, and in other fields and yet many of these never see the light of day. They are technically feasible, yet in the last analysis they are not the ones selected.

Let us explore the question of analysis of systems in the visual communications area. First of all, when one begins to discuss analysis the most important first requirement is to define what is wanted. This is the question of objectives and there are just many, many possible objectives, and the relevant one is an important clue to the best sort of system. For example, it is possible to produce beautiful printing by employing certain systems. And for certain requirements--certain objectives--these are indeed the optimal systems to use. However, when one is talking about the metropolitan newspaper and its production on a very tight schedule where hundreds of thousands of copies need to be run off very quickly, one had better recognize that there are more relevant communications objectives than beauty--objectives particularly of time and quantity that simply aren't going to be met by setting as the first objective a beautiful result. There would also be in that case a question of cost.

Systems analysis begins with the definition of objectives. Secondly, it is particularly concerned with this question: For a given system, what are the costs and what is the output or the effectiveness of the system? We can then compare one system with another and ask how the cost-effectiveness ratios of these systems compare. This type of approach has been used in military planning. The Department of Defense has been using a cost-effectiveness approach to systems selection with some very interesting results. In so defining systems and in so costing them and so the comparing them, military planners have decided, for example, that the B-70 Moch 3 bomber just would not compare favorably in terms of cost and effectiveness with other alternate systems into which the Department of Defense could put its resources. Thus, the analysis of a system is concerned with objectives, with technical information about the system itself, and with economic information about its performance and its costs.

An increasing amount of attention in many areas is being given to the systems analysis approach. There is hardly any area of choice, particularly a choice among investment alternatives, where we have not had somebody somewhere doing a systems analysis. There have been analyses of the police department systems in major cities, urban rapid transit systems, air travel systems, water pollution and its control, and military systems, of course. Problems in education are also being examined.

## SYSTEMS SELECTION

Now let me turn more concretely to some examples of choices among alternative systems in the field of visual communication. The question in all of these instances is what is the best system, how best to accomplish some communications objective. Take the example of a magazine publisher whose periodicals are being now produced by what one might call a relatively conventional printing system. It is one that involves the keyboarding of material in the composing room, its conversion to metal type, the conversion of that type into electrotypes, etc., right on down the line. He now wants to know whether this system is best for his purposes, and he asks this question with respect to a range of new systems or combinations of systems. He wants to know whether it would be feasible to have typesetting done through some sort of computerized phototypesetting process. He also wants to know whether he ought to be having the printing done by means of the offset rather than the letterpress process. In this case, it is important for the analyst to understand what his objectives are. They happen to be relatively simple with respect to printing quality. He does not ask for much four-color process work; he requires mostly black and white because he does not have to satisfy advertisers' color requirements. He does not face rapid turn around times; he can take a reasonably lengthy period of time, indeed, to produce the material. These are conditions that are important to the development of a range of systems possibilities.

Another communications case is the problem of advertising media. Now the advertising for this particular product can occur by means of magazines or television. Two quite distinct systems involved. The question relates, among other things, to the type of audiences involved. Can it be best reached through print, TV, some other method, or a blend of media?

A school has a number of communications systems problems--as an example, the question of whether or not to utilize so-called teaching machines in certain subject areas. The analysis involves the concrete educational objectives, the capability of teaching machines to accomplish these objectives, the capability of other approaches, such as the conventional classroom approach, and the estimated cost-effectiveness ratios for each.

The newspaper has the choice, more and more today, especially if it is not a large metropolitan daily, whether to continue to be produced by conventional letterpress processes or whether to move, as a number are doing, to web-offset printing processes, even apart from the question of how the type is set. There are going to be certain advantages from web-offset in terms of the ability to print more pictorial matter, in the terms of the ability to handle supermarket and other full-page advertising less expensively, etc. This choice between two systems, as is often the case, is one between the old and the new.

A library, as I have indicated, may very soon have to make a choice as to whether it shall install a computer, or tie-in with a computer; whether it shall build more shelf space for books or go the microfilm route, or some mixture of the two.

An association is wondering whether it ought to disseminate technical information about the product of its industry by the usual printed means or perhaps move (not necessarily to the exclusion of print) into dissemination by microfilm and perhaps even by computer tape because much of the information is numerical and could easily be stored in a computer where it might indeed be far more useful to certain large buyers of this industry's product to have that information directly on tape.

A question that a number of companies recently faced with respect to institutional advertising was the question of whether they should participate in the Montreal 1967 World's Fair. The question for them, and I know this was the case of the big automobile companies in the U. S., was whether this was the best system to accomplish certain institutional, public relations, or public education objectives? There are alternative systems, including institutional advertising on television, and this is one route that a number of major corporations have followed. For example, notice that Gulf Oil Company has been sponsoring a good part of the coverage of the NASA space flights; Gulf did not have a pavilion at the 1964 New York World's Fair. And if there is a decision to participate in something such as a world exposition, then the question is how much to spend. It costs $1.50 per visitor for an organization like General Motors to build and operate a big World's Fair pavilion. (Note again, that for its $1.50 per visitor it may be able to get something far more effective if it chooses not to adopt that system for communicating with the general public.)

Some of the examples I have just given require fairly major choices for an organization. Others can be very small. As an example, if your office sends out many standard letters, you might ask yourself whether it would not be advisable to install an automatic typewriter system; that is, a tape-driven typewriter that rapidly retypes the same letter as many times as you want, and all that the typist has to do is to stop the machine to insert the personalized information.

Today why does it seem as though more and more we are facing the need to conduct, formally or informally, simple or complex systems comparisons? First, this is a reflection of the technology of our age and the technological choices that it brings to us. Most of the cases that I have just cited did not exist very many years ago, because no such choice was conceivable. For example, a magazine publisher until very recently did not have the choice between web-offset printing and letterpress. There was basically one technology. Now there is a range of them; each has limits, but the engineers are generating more and more possibilities. Advertisers did not have the choice of TV before the Second World War. Only in recent years have educators had even the opportunity of considering the so-called teaching machine. Thus, systems analysis is more and more required because there are more alternatives that require our making choices. Second, in some cases these alternatives vary quite widely as to the form and cost of resources required. Some are quite heavy in capital cost and light in labor cost; while for others it is reverse. For example, if you are going to consider installing an automatic typewriter, you need $3,000. But if you do install it, your labor cost can be far lower per letter if you produce many letters. You may be able to turn out all the letters that you need to write with one operator rather than two or three. It is more likely that new systems will be capital intensive and older systems will be more labor intensive. This is not always the case, and in designing new systems, we may in fact find that we can shape the costs quite favorably with respect to capital investment required.

Third, alternate systems may generate somewhat different results. For example, in comparing an automatic typewriter system with a multilith system, we recognize that we are going to get usually different results. One system may give some effects we prefer not to have, and then we have to ask ourselves whether that effect is so significant to us that it would be better not to employ the system. By the way, the differences in systems results can be terribly important when we are talking not about private investments, but about public investments. As a case in point, in the area of urban rapid transit, one of the issues central to the question of what sort of system you use is what form do you want the city to take? If you build high-speed rail rapid transit that typically links stations strung along a linear route, you will probably get a development of high-rise apartments at the subway stops. On the other hand, if you choose a nonlinear system such as high-speed express busses that can take people directly out into the suburban net, the city develops a different form. Which form is preferable? Fourth, we note that the selection of systems is also made complex by the fact that what serves one user well may not serve someone else well. For example, some publishers have relatively simple technical requirements when it comes to a printing result, such as not requiring a lot of color in their publications, but for the New Yorker or Time, color would obviously be very significant and two different systems might be needed. Or, to come back to the question of rapid transit, in Europe, it is said people prefer apartment living more than Americans do, and if this is so then rapid transit systems of the conventional sort may be better suited to European cities than to American cities where there seems to be a greater preference for detached, single-family homes that have to spread around the landscape.

When I have been talking about systems and the choice among systems, I have really been talking about the allocation of resources, because systems are available at a cost--cost of capital and cost of human resources that enter into the system. Once committed to a particular system, it may be only with difficulty that one can free the capital and indeed free the human resources to some other use. Thus, if by chance the optimum solution was not selected, then the choice that was made is even more costly because you have foregone some system that would have worked more effectively. If, for example, in a major city we put in a high-speed rail rapid transit system when indeed the better system would have been some sort of express bus system, to take two possible alternatives, one is going to have some very high so-called opportunity costs because of what we have foregone by choosing the less suitable system.

## SYSTEMS MANAGEMENT

As we get into the question of resource allocation, more and more we are dealing with central management problems--problems of planning and decision--that involve choices to be made about capital and human resources, including the sorts of skill required, the level of these skills, the degree to which they need to be redeveloped and so on. Thus, we cease talking about systems in a technical sense and now are concerned with systems management, or just plain management. And in this respect, what is the difference between what I have been describing here and what good, solid, analytical thinking may have produced in the past? Let me suggest that there may be no difference. There are examples of good systems work done in industry, government, and education many years ago, but I would suggest that what I have been describing has comparative advantage over what might be called the "seat of the pants" approach of the past. First, there is a thoroughness of analysis that one is not too likely to encounter with a less formalized approach. There are likely to be considerations that have just simply not been included. Second, there is a probability that more alternative systems have been considered. Third, the approach I have been describing tends to induce making measurements, measuring the performance of a system or estimating what its performance will be. There is more and more attention, in other words, to trying to quantify what we have not previously sought to quantify. Fourth, the approach I have been describing gives one a greater likelihood that he has looked at the integrated, over-all problem. In the past, we have very quickly said, "That is a fine new device; let's get one." If you got such a device, you might only then have found that you had to change three or four other things. You had not really thought the system through. Or the device may have simply not been suited to what your real objectives were. We know of many instances where hardware, and also people, have not been well used because there was tendency to think in terms of components rather than in the terms of the system. Fifth, as we begin thinking systems, we begin thinking of a blend of systems. For one purpose one system is better than another, but the converse is true for a second purpose. Thus, no one is seriously proposing to replace all teachers with teaching machines. On the other hand, it is quite clear that we are going to see an influx of teaching machines into education, which is simply to say that we will have a variety of systems and we will come out with multi-media approaches just as in advertising communication the choice is not typically whether we are going to use only newspapers or only magazines or only TV. But how are the breaking points between media decided upon? At the points where one system becomes more productive or more effective than another. Finally, the approach that I have been describing here suggests seeking to find optimal systems. Indeed, there are some techniques that have been used, particularly in the military, but also in indusry, and here and there in education, by which mathematically one can search for and identify an optimum. That is not likely to be the technique of most of us, but what we are, however, likely to remember is that there is, at least, conceptually, a best way to keep as an objective even if we never reach it.

## CONCLUSION

In conclusion, it is clear that the technological changes that bring about new systems and the economic factors that lead to the selection of particular systems and to their revision, have important human resource implications. That is, most systems are not going to be automated systems. There is still the critical role of human resources in modern systems.

# HUMAN RESOURCES FOR VISUAL COMMUNICATION

## INVESTMENT IN HUMAN RESOURCES

The phrase "investment in human resources" is a fashionable term. It is fashionable when the question arises whether or not it would be advantageous for society to increase the amount of its human and capital investment in education. In this discussion, we are going to look at the question of investment in human resources for visual communication.

Investment in human resources does not relate only to formal educational activity. It also means investment in training and retraining which is conducted typically within the private sector--within organizations, industries, professions, and so on--and does not draw primarily upon the public budget. It also means the continued investment that society makes in what one might call career development, and this can be as simple as the development that occurs on the part of a skilled production worker as he learns something new about his trade, or attends the meeting in which new information about that particular field is being disseminated, or learns by doing something new. Yet it is in fact an investment of his time or his employer's time. At the other extreme there is the total concept of career development that we more typically assign to the professions, not only the classical professions but all high-talent activity in our society. Thus, investment in human resources has become one of the central concerns of contemporary society around the world.

The developing country is critically involved with investment in human resources. The developed society that wants to grow and improve is also. Why is this? We can say, first of all, quite simply that investment in human resources pays. Investment in human resources, in other words, generates a quite high rate of return on the true cost--that is, on the true resources that are committed. The return from an investment of this type is private, to a certain extent; namely, it leads to added private income. But it is also social, as we know, because it may indeed save society the costs of underemployment and poverty among its citizens. Moreover, investment in human resources is a means by which all of society can achieve a higher standard of living--a higher quality of service from the economy, whatever the services are that society wants.

When we talk about an investment in human resources by means of education or training, what we are saying is that in the whole process by which economic development occurs there are two sorts of investments occurring, and they are occurring together. First, the more conventional type that we associate with the term, namely investment in physical capital. This investment, in a changing society, not only adds to our stock of capital, but even more importantly embodied in it is new technology. The fact is that economic growth in a developed society is far more a matter of simply increasing the amount of capital per se. Thus, when we speak less conventionally of investment in human resources, we are also acknowledging that a very good part of new technology is reflected not in things, but in people.

The particular type of investment that we make in human resources is a function ultimately of the sorts of services that our society wants. Thus, if usual communication services seem to be something that societies, both advancing and developed, want, then investment in human resources for visual communications will occur.

## INVESTMENT NEEDS

But we are not concerned simply with larger investments *per se* in human resources for this or any other field. Greater numbers and longer periods of education we may need, but I think there is something even more important. Namely, we need more effective education and training. We need to make better use of the resources that we apply to this field. That I think is the real challenge. The question then is how to do this--how to increase the amount of knowledge in some given period of time, how to expand the range of fields of knowledge, and how to introduce this relatively tremendous flow of new knowledge. We could make this assertion about any field; we can surely make it about the field of visual communications. What are some of the concrete problems that we have to face? Take, for example, the education of people to become the skilled production, operating personnel in the field. I think one can say two things. First, we know that the educational system has not been able to keep up, by and large, with changes in the field, and in consequence this type of visual communication education project is being launched. We have certainly gone through a period, if one takes the country as a whole, in which there have been important deficiencies in what is done to educate youngsters to prepare for skilled jobs in visual communications, especially in printed communication. Second, we can also say with respect to skilled personnel that there is a very serious question today whether the apprenticeship method of training is not completely obsolete. Has it in fact served its purpose? This question needs to be faced, a question not of formal education so much as post-employment training. Third, consider the problem of the technician. It would be hard for one to put his finger on more than a few places around the country where you can find people who are trained as technicians in the visual communications field. Fourth, consider the engineering and science problem. We have only recently begun to suggest, and maybe not very effectively, that this is a broad enough field to warrant some attention by colleges of engineering and science, apart from the work of electrical engineers in TV and so on.

Look at the question of the education and training of designers. Much of design education as we have known it is obsolete. It has risen out of a single-focused orientation and it has simply not been able to give to the future designer the sort of cross-disciplinary approach that he needs. Managers are another group. From some fairly close experience with the education of managers for the graphic arts, I can assure you that there are only a handful of institutions that are oriented toward the education of graphic arts managers. But if we were to look at those there are, we see that things are pretty much out of date, with one exception, and in that case we still have the problem of an industry that isn't yet willing to see necessary change occur. Thus, it can be professionally said that printing management education, as we have known it and know it today, is something that has been outdated for quite a while and is getting more and more outdated each year. Add now the education of the users of visual communications--the question of how well they have been introduced to this field--and we get the answer that they just have not been introduced to it at all.

These problems exist--problem of the effectiveness of our investments and not just the quantity of them--in good part because the rate of change with which we have to deal is simply so great that it is very difficult to keep an educational program up to date. Especially is this so if we are seeking to teach relatively concrete knowledge about particular systems. That, of course, is where the printing field went astray. I can speak for the college level in that respect. It was assumed, apparently, that printing would stay pretty much the way it was--that is, "In the Beginning There Was Letterpress, And Then There Came Offset." There would not be any really earthshaking change. Things would still be pretty much the way they were. If you taught the established operations of hand composition, machine composition, and so on and so forth, you were doing a pretty good job. I am speaking of some college programs here, not just of high school programs; and maybe until ten years or so ago this might have been acceptable, but it is not any longer. The acceleration of the rate of change simply has made the problem of education more difficult. So we are dealing with a need for more effective education, even more so than a need for a greater amount of education or a larger number of educated people.

## PROJECTED NEEDS

What projections can one make about manpower requirements in the visual communications field over the next ten years or so? Instead of numbers per se, let us identify some general directions that are significant, first by occupational category. In the category of skilled personnel (in this case, skilled graphic arts personnel), despite the fact that there are going to be some really important displacements, particularly among typesetters, the total demand for printing services will rise rapidly enough so that in 1975 there will be a larger number of skilled, as well as semi-skilled or operative personnel required in printing. This assertion holds doubly if we recognize that more and more printed communications will not only be produced by commercial printing plants but will be produced by virtually any organization of any size through the use of the offset duplicator and so on. In the technician category the number that will be required will not be anywhere near so great as one would expect to find in an industry that is heavily oriented toward engineering, research and development. On the other hand, it is quite clear that there are going to be expanded opportunities for people who have the type of education I would describe as that of a technician or technologist. These opportunities will occur across the whole field. Some of them will be in printing plants. Some, of course, will be in the TV and motion picture world; some will be in drafting-related activity; some will be in advertising or publishing, or in paper companies and paper supply organizations where a knowledge of the production uses of the material is required. Because technicians are going to be required, there is a good opportunity for the development of technician programs in junior colleges, for example. In the engineers and scientists category, the number will vary by the branch of the industry. Clearly there will be more required in printing per se. There will be more definitely required in the equipment fields. Engineers and scientists are going to enter areas of this field where they have not been before. As to the number, however, it will not be anything like that employed, for example, the aerospace industry. But there will be a rising requirement, and it needs to be made clear to professional engineers and scientists, including those with advanced degrees as well as with undergraduate degrees.

The designer's role is going to grow. There will be a rising number of designers utilized in visual communications. If one were to plot a curve of the number of communications designers that are employed now and over twenty years back, one would see the growth of this profession. This number--this demand--is going to increase. Among other things, as one encounters more and more demand for communication, there is going to be a rise in competition among communications media, and therefore one of the things that will be stressed is the effectiveness with which this communication is prepared. Thus, designers, especially those who are well-equipped to these complex design problems, are going to be more important. As for people in the managerial ranks, most of them are employed in small firms. In fact, the number of managers who are employed, for example, in printing alone constitute a very substantial number when one adds up all the presidents, vice-presidents, and so forth. Thus, there will be a rising number here.

As to employment by various regions, certainly there is a movement under way which follows population, west and south along the Florida-California corridor, and the fastest growth will occur where fastest population growth is occurring. This is not to say that there still will not be a very major concentration in the big Eastern metropolitan areas. But there will be a diffusion across the country to other cities as they grow.

By particular branches of visual communications, for example, in graphic arts, there are going to be some changes. It would not really pay one to invest heavily in the education of persons to become photoengravers, as a case in point. Is it going to pay to invest additionally in the education of persons to become linotype operators? There will be replacement requirements, but the shift is going to be to other methods and other sources of personnel, perhaps.

However, some human resource needs are more critical than others. Which are the ones that really seem to be the most critical? One can encounter good arguments about this, but my own list of the more important areas would begin with engineering and science despite the relatively small numbers involved. These are the people who can either (1) develop the new systems technically, or (2) if the systems or their components are developed somewhere else, can make use of them most effectively. It is true, and perhaps unfortunate especially in the graphic arts, that the technical training of most people does not have a sound engineering and science base. It has been more a matter of learning by doing. And although this worked all right when we were dealing with a relatively stable set of systems, now we are going to be facing a need to bring into graphic arts, and into the other communications areas if they are not already there, people with technical backgrounds. Somewhat less critical, but still important, is the need for technicians, the need for designers, and the need for high-talent manpower in management--in particular, managers who have technical or other communications education.

Why haven't I acknowledged the need for skilled personnel? I do, but I do not think this is the critical need. In terms of numbers, it is the greatest. Yet the critical need lies at a higher level of talent.

There will also be, in the coming ten years or so, a retraining problem. Whether it becomes one that is critical remains to be seen. It depends, in fact, on how rapidly some of these new systems come into the field. My guess is that the retraining problem is not going to be too severe with the exception perhaps of conventional typesetting, and there, of course, the problem may be made more severe by union policy. This is the real question in the printing field. Is the International Typographical Union going to commit suicide? It may.

Let us examine education in some of these fields in more detail. In engineering and science, there is an opportunity to develop some college-level work in visual communications that is engineering oriented. At Carnegie Tech, we have proved that it can be done. One can teach printing, for example, utilizing an essentially engineering approach, although it has never been done before. As to technicians, there are a range of these occupations and a range therefore of educational requirements. But we are now beginning to find what it is that would make the appropriate program educationally for our technicians. With respect to the education of designers, let me sum up simply by sa ing that we need an approach that is communications-oriented rather than simply oriented to the development of visual arts skills. As to managers, one can first say that in the field of management education generally, there have been some important breakthroughs in the last ten years. The question is whether those institutions that have some specialization toward the visual communications field will also adopt the breakthroughs that have occurred. This has been done at Carnegie Tech, and I just hope that it will occur elsewhere, for the breakthroughs are by now quite well defined. Basically what they involve is the finding that business education should be centered on a set of fundamental economic, behavioral, and quantitative disciplines with less how-to and more know-why being stressed.

It seems natural to have talked first about formal education, but the fact is that to a considerable extent we have equal or more serious problems when it comes to training of people. That is not to say that there are not some effective training activities going on, but if you consider that many of the branches of this field consist of small firms that do not have the capabilities of organizing training *per se*. That to a considerable extent the apprenticeship training system has been the process used in the past and that the technical content of training has been quite traditional, you can understand that on-the-job and continuing training in this field does not have as much depth to it as is encountered in other industries.

EDUCATIONAL PROGRESS

Thus, in many cases today both formal education systems and training systems, as well, are obsolete. The few that are not are really pioneers; they are the exceptions. On the other hand, we can be optimistic about what is going to happen at the high school and the junior college levels. Indeed, the effective pioneering may more likely occur at these levels than among those degree-granting institutions that have been traditionally involved in graphic arts education. Additionally, if the system of apprenticeship is on its way out, the high schools and junior colleges may become deeply involved with its replacement.

The education and training problem, in the graphic arts at least, has been in part a problem of recruitment. That is, this is a world in which there are increasingly interesting opportunities for youth. But the graphic arts field has not had its share, in the past, of the really well-qualified youth at either the college or the high school levels. This is the case, in past, because the image of occupations, jobs and environment in which one would work in graphic arts has been the image of the "dirty little print shop." This image still is an unfortunate one that holds back attracting some of the better youth, both at the high school and the college level. Hopefully, one of the by-products of the new concept of "visual communications" is that this image will vastly improve. And to help matters along, instead of Benjamin

Franklin, perhaps the printing industry ought now to select George Eastman as its patron saint, for the image of Benjamin Franklin's printing certainly does not suggest a contemporary, space-age field to our youth. Here, too, the leadership in redefining this field could very well flow to the secondary schools, the technical institutes, and junior colleges, and to institutions such as Western Washington that are developing programs aimed primarily at better education at these levels. Perhaps leadership will flow there, because I do not see important leadership emerging at the college-level at this stage, or in industry.

## CONCLUSION

One major need with regard to planning manpower development is quantitative analysis of what the requirements will be--by level, by occupational category, by major region, etc. Of course, we continue to make educated guesses and this is usually the way we have proceeded, but an analysis of what the requirements are--done as well as we know how to do this type of thing--could be valuable. We do not now have such figures, with perhaps a few local exceptions. Additionally, as this field continues to change, in terms of technology and the economic factors at work, and therefore in terms of the sorts of people required, there is an opportunity to engage in educational experimentation. We certainly do not want to freeze educational programs. The rate of change alone argues against this. More importantly, the diversity of the field seems to argue for a relatively experimental approach to the programs that are developed.

# PSYCHOLOGY OF COMMUNICATION

## by DR. MARTIN KRAMPEN

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### Definition Of Theme And Terms

Design theory + design research = psychological theory of design + psychological design research

The word psychological is here used for the science studying human (and sometimes animal) behavior. People often think that psychology is the domain of the psychiatrist's couch, but the study and therapy of "abnormal" human behavior is certainly only a small part of psychology as a science of behavior.

The expression design is here used to encompass all the operations, "mental," manual, and otherwise, which lead to products of visual communications, industrially mass produced (consumer) goods and building parts, in short those products which constitute our "artificial" environment. For the sake of clarity, the engineer's manipulation of material microstructures (sometimes called "design of materials"), the allocation of resources, scheduling, organizing and similar activities as well as the engineering of systems which exhibit little contact with human users or operators should be excluded from this definition. Also, design is here understood as being "applied" to environmental problems, and not "basic," as it might be taught in a "foundation course" of a design school. Given these two definitions (=psychological + design), the difficulty of talking intelligently about a synthesis or combination of two such extensive fields becomes immediately evident. The knowledge of human behavior could be applied to literally all phases of the design process, or play a decisive role in all design decisions.

One is tempted to ask, why this "synthesis" is seldom talked about by designers and psychologists alike. One of the reasons may be that the field is simply too extensive in scope and that any attempt at its unified description must remain superficial and incomplete. This is probably true and in this survey, it is recognized, that the pitfalls of oversimplification and incompleteness cannot be avoided. One segment of application of behavior science to design problems has become known, since World War II under various names, such as "Human Engineering," "Human Factors," or "Ergonomics." This indicates that the problem is not only large in scope, but also historically new. In academic circles, psychologists have often tended to look down on the application of their theoretical frameworks to such mundane problems as the design of seating furniture or the layout of office space. Consequently, the major advances in the field have often been relegated to the defense industry, were for example, the seating for tanks, or layout of Bridges of Central Rooms in fighting ships became an object of serious study. However, engineers did in general not find psychology "exact" enough to apply it widely in their problems. In this sense they often engage in an "unholy alliance" with industrial designers against the application of psychology in design, while they treat the designers themselves as "court jesters" good enough to add some joyful decorations to the drab products.

Designers have been notoriously afraid to subject their intuitive solutions to quantitative testing. The profession of industrial designers is relatively young (if we take the foundation of the Bauhaus, 1919, as its starting point). As one economist, Kenneth Boulding, points out, there is a strong tendency among trades and professions to set up artificial communication barriers between themselves and toward the public, to prevent price cutting, to regulate entry in the profession, and to cover up the mistakes of the practitioners by a conspiracy of silence. Thus, the medieval concept of a craft as a "mystery" only accessible to initiates, dies hard. One would expect this tendency to be most pronounced in a relatively young profession and in one which traces origin back to the aesthetic reactions of "Arts and Crafts" against the Industrial Revolution of the last century. No wonder then that most design schools continue to resist any acceptance of behavioral sciences into their curriculum and therefore continue to graduate "intuitive" designers producing design solutions of mysterious origin, confined to the skill of the artist-creator.

## Science And Design

This attitude is based on a lack of understanding of what science is all about. "Intuition" plays an important role in the context of scientific discovery. At least there is no legislation against making a scientific discovery by intuition or even by accident. The result of such a discovery is generally couched in a verbal statement called a hypothesis, which is then subjected to a more formal scrutiny by testing it. Once a hypothesis has been confirmed by a test it is with a certain degree of statistical confidence "accepted," however only as long as no evidence to the contrary emerges through further testing.

What the designer does is not all that different! He embodies his hypotheses for the major point hypotheses about human behavior, into the features of the objects or visual messages he designs. He is in fact, constantly involved in making non-verbal predictions as to how people will react or behave. If he designs a cup with a handle, he is confident, almost in a statistical sense, that only a very few people out of a sample of, say, a hundred will not lift the cup by the handle which he incorporated in his design. If he designs a poster for a political candidate, he is similarly confident that the poster will increase the number of voters for this candidate significantly. However, he will seldom submit his non-verbal "hypotheses" to a formal test and thus eventually contribute to a stock of design knowledge which can be communicated in a standard language and becomes accessible to everybody.

## Psychology Of The Designer And Psychology Of The Consumer

After these preliminary remarks pointing out some of the difficulties of our topic we can now proceed to show some examples of successful application of psychological research to the field of design. It appears that this application can be made in two main directions. First, the designer and the design process can become an area of psychological investigation. That means that the designer's problem solving, the "creative process" itself, becomes an object of study and that the interaction of the creative designer with other persons (e.g. in organizations) is under scrutiny. Second, the client of the designer, the potential "consumer" or "operator" of the product to be designed, can become an object of psychological investigation. Such investigations have been carried out under various designation such as "human factors," "motivation research," "experimental aesthetics, etc.

## Psychology Of Designers, The Process Of Creative Thinking

It has already been pointed out that the artist--designer resents strongly the psychologist's "prying" into his way of solving design problems--into the "creative" process. Such investigations are said to lead to a de-humanization and mechanization of the act and product of creativity. This is, in fact, not too far fetched: Simon, Newell, and their colleagues, and others after having studied the human problem solving process came up with a computer program simulating human problem solving and usable for a decent game of chess, composition of music and other mildly creative tasks. Newell, Shaw, and Simon report that one of their programs has discovered a mathematical proof for a theorem in Whitehead & Russel's "Principia Mathematic" (Chapter 2), which is shorter and more elegant than the one published by the authors. (At the time "The Journal of Symbolic Logic" refused to publish an article co-authored by the computer program which carried the name Logic Theorist). Furthermore, as far as artistic motor skills are concerned, computers can "draw" prospectives and have recently advanced in the field of animated films.

The observation of the human problem solving process in chess players, composers, etc. is possible by encouraging the subjects to "think out loud" while they are engaged in their task. Thinking-out-loud protocols can thus be examined as to their underlying structure and be compared. While parts of the "creative process" may remain "subconscious" over periods of time, creative persons will admit that they are verbalizing internally (talking to themselves) during much of their creative activity. This verbalization brought to protocol by the thinking-out-loud technique show evidence of a selective trial and error search process going on in the problem solver's mind. Instead of going through all possible combinations of pathways from a starting point (the problem) to a satisfactory solution of the good problem solver is able to employ various strategies, abstractions, and patterns which reduce the enormous space of possibilities (for instance in thinking a few moves ahead in chess) to a "manageable" size of promising avenues. His solution is called "creative," when it is novel to him or his society, when he employed unconventional ways of thinking (e.g. connecting two fields which were heretofore thought of as being completely heterogeneous) and when he displayed a great deal of persistence in sticking to a seemingly unsolvable problem. Also, clarifying an otherwise ill-defined problem, makes us attribute "creative" thinking to a problem solver. The difference between "routine" problem solving (such as writing a form letter) and "creative" problem solving is only a matter of degree--there is more trial and error search involved in the latter.

## Can Creativity Be Taught ?

If such problem solving behavior can be "copied" (or simulated) in computer programs, then it should follow that it also can be "taught" to human beings to some degree. In fact, there is some evidence (quoted by the psychologist Skinner) that copying from reality (on which our Art Schools still concentrate a great deal of effort) can be facilitated in children through reinforcing (by any form of applause) successive approximations to more and more perfect reproductions from a simple beginning with scribbles on paper. If a child is continuously reinforced in his scribbling, finger painting, and finally drawing behavior (at the expense, for instance, of his ability to count, add, or solving equations), then he might have acquired at the end of his high school years an ability which sets him apart from his peers and makes him and others think of this ability as a "God given talent." He might, on the other hand say that he has "no talent" for mathematics or French (to which one would have to reply: thank God that you were not born in Paris!). One study on "Commercial Art" students showed that many of them had a hard time to rationalize their way out of the feeling that they betrayed their God-given talent by engaging in commercial pursuits. The support of their parents and teachers had suddenly been withdrawn when they became "serious" about choosing a purely artistic career, and only by "compromising" (in choosing "applied art") could further support be obtained. Thinking of parental and other societal "reinforcement" the difficulty of developing creative attitude becomes quite evident. How can an individual continue to think "unconventionally" (if this is due of the conditions of creativity) when he is constantly subjected to reinforcement of conformity? This leads to the question whether an individual or a "team" is better in creative problem solving. "Brainstorming" in groups has been advocated by some psychologists as a means to attain creative solutions. This can be true only to the extent that the group holds back any criticism of ideas which may be proposed by individuals during the session--no matter how "far out" they may be. Other studies show that the effectiveness of groups in solving certain tasks decreases as their membership increases. In groups of more than three or four individuals the advantage of combined knowledge and of detecting faulty solutions by other members is outweighed by other factors.

The disadvantage of mental rigidity (as manifested in dogmatic belief systems) in solving problems has been studied by psychologists. "Rigid" personalities are unable to tolerate ambiguity, are not capable to live with situations which do not immediately lead to clarity, and are therefore not capable of the persistence needed for creative problem solutions.

## Designers In Organizations

It has already been suggested that the shaping of creative behavior could be accomplished through parental and societal reinforcement, but that the same societal forces may hamper creativity by imposing conformity rules upon the creative individual. How does the designer adapt to organized society? In order to find an answer to this question a study was conducted on designers employed by industrial organizations in various countries (U.S.A., Canada, Germany). The designers participating in this study were asked to describe, how they felt about their present job, by sorting a set of cards containing job descriptions on a numerical scale ranging from "applies to my job" to "does not apply to my job." After they had used these job descriptions to describe their present situation, they were given another set of cards containing the very same job descriptions, only this time prefaced by the phrase "ideally" or "in an ideal job." These cards were used to describe their job ideal, again on the same numerical scale. Thus an actual job description which were scaled low (scored low) might have been scaled high as an ideal job description. For an example, many designers scored the description "My place of work is quiet and free of disturbances" low as a description of their actual job, while they scored the description "in an ideal job my place of work would be quiet and free of disturbances" high. For each particular job description then, a difference score on the numerical scale was derived, and by averaging over the different scores, and index of discrepancy between actual and ideal job was derived for each designer. It was found that the size of the discrepancy depended on such factors as the "climate" in the particular organization and personality characteristics of the designer. Some of them were more "organization men" and had a lower discrepancy score, others were "mavericks" and had a higher discrepancy score. An interesting finding, however was that the designers of all three countries examined, showed (with only minor differences) the same job ideal: Designers want a job in which they can use their creative ability; they feel confident that they can handle any design problem; they want to work in companies encouraging new product ideas; they want decisions on their design solutions by competent bosses; they want a pleasant and intellectually stimulating company atmosphere. They reject the idea of spending their time on routine work and sticking to the design of only one variety of product. They want control over the areas related to their designs (advertising etc.) and they like contact with other designers. Thus it might be predicted that designers will adapt best to an organization in which they are recognized as competent, creative professionals, and faced with a variety of challenging design problems. Recently, the same experiment has been repeated with freelance designers. It was found that there was no difference between the job ideal of freelance designers and designers employed in industry. However, the difference was clean cut between the actual job situations. Freelance designers seemed to have less of a discrepancy between their actual job and their job ideal.

## Psychology Of Consumers

As the application of psychological research to the field of design can proceed along the lines of studying the design process and the designer, it can also forge ahead in focusing on the consumer, as user or operator of designed products. This does not necessarily mean to delve into the depth of the subconscious wishes of the consumer or sell him popcorn by subliminal advertisings flashed insidiously on motion picture screens. The concern of psychological research on the consumer and operator is with fitting the product to the human being using it. Often the researcher has to start with the physical measurement of the human body if he wants to end up with the psychological variable of feelings in the consumers. Too many products are still designed to fit the "average man!" If doors were designed for the "average man" by definition 50% of the population would bang their head against it. The same criticism applies, of course, for much subtler questions, e.g. to the choice of color or fabric for an office environment. The ultimate objective of the researcher providing "human factor" data to the designer is to make the life and work of the consumer more secure, comfortable and productive. That the designer cannot always obtain this result by just applying common sense can be seen by this example: Common sense would suggest that in a given working situation objects (materials or tools) should be always stored close to the area of their usage, in order to obtain a better work output. This must not be necessarily true. A typist in an office might welcome the occasion to get up from her seat, from time to time, because she might get bored due to lack of physical movement. Obviously her overall work output would increase, if we took this factor in account in our space planning. Work output is closely related to "morale," which in turn results from numerous aspects of the working environment and its human interactions. It is therefore important to study each kind of working or living environment specifically. E.g. the measurements made on consumers as operations have to stem from the group of people who will use the goods or equipment you design. Measurements used in the seating of tank operators must be different from those used for the design of a typist's chair. Unfortunately many of our human factors data stem from specific military groups and cannot be generalized to civilian task situations. Moreover, most published data are "static" and do not apply to the dynamic situation in which the consumer or operator finds himself. The arm length of typists is not necessarily relevant to the reaching movements she has to perform--the reaching movements themselves have to become object of measurement.

A special field of applied psychology is the study of legibility. Much work has been done on gathering data for the design and the layout of instrument panels in aircraft. The legibility of certain type faces and arrow shapes has been tested for road signs. For instance, in a recent experiment in Britain it was found that the shape of arrow heads as used on American and English road signs yielded more wrong responses than a shape used on Belgian road signs. The experimental subjects were given cards on which were drawn twelve lines radiating from the center of a circle in the directions of the numbers on a clock face. The experimental arrow designs were exposed for short durations pointing in various directions corresponding to the positions of hours on a clock face. The subjects noted down the direction in which the arrows pointed on their cards, and the experimenters counted and compared the directional arrows totaled for each design. This ingenious and elegant experiment shows how design solutions can be tested with comparatively little effort in terms of time and money, perhaps even by the designer himself. However, we find that such tests are often only applied where a design failure would be a matter of life and death (as in road signs). The knowledge gained in these experiments is seldom applied in the design for everyday life: A dashboard of a car is a far cry from applying the data on aircraft instrument panel design and many a printed page or book cover from the data of roadsign and other legibility research.

## Consumer Preferences

The most controversial subject matter of applied psychology would probably be experimental aesthetics. The psychologist would find the designer's resistance against research in this area particularly strong. Either the designer believes that he is the only professional competent in making aesthetic decision or he will argue that it is not his task to investigate the public's preferences and then "give the public what it wants," but to change the low taste of the populus.

Studying the public's preference and "giving the public what it wants" are of course two different propositions and the latter does not necessarily follow from the first. It is perhaps another example of faulty application of common sense if designer fear that knowledge about public preferences meant to give in to every preference of the public. For one thing, the preference of the consumer may be simply a feedback of the narrow range of aesthetic choices displayed by the supermarkets and warehouse catalogs. And then if there is a distance between the designer's taste and that of the public, it would be better for the designer to know about it in order to incorporate those communications into his budget, which are necessary to move the public's preferences closer to his own. Unfortunately, early research on aesthetic preferences has not been as sophisticated as the subject matter requires. At first psychologists went about to measure "average preferences" for color and found different answers year after year. Only later it became evident that there might not be such a thing as an "average preference" for a color but that different kinds of hues or saturations might appeal to different types of people. Informal evidence from (outdoor) advertising and audio-visual practice suggests that "warm" colors have a great "carrying power" especially when viewed in contrast with "cold" or dark background colors. These suggestions seem to jibe partially with results from air-sea rescue experiments in which, however, visibility was attributed more to color saturation and brightness than to hue.

While colors can be better discriminated than forms or shapes, the number of individually identifiable colors is small (10-12).

Legibility seems to depend on brightness contrast between letters and lettered surface. Thus, the darker the color of the message and the lighter the color of the message carrier, the better the legibility. Experimental results on the legibility of particular color combinations are, however, contradictory. Black on yellow appears to be one of the best combinations.

Colored lights alter the color of objects considerably. The interaction of various color reflectances in an environment sums up to a total brightness coefficient for that environment.

While the "opponent colors" theory (going back to Hering) seems to account parsimoniously for many phenomena of color vision, Land asserts that color theories based on contrived laboratory experiments are not realistic. According to Land, our eyes have the ability to distinguish the longer waves from the shorter waves in the visible spectrum and color in natural images depends on a varying balance between longer and shorter wave lengths.

Increase in haziness, blueness and desaturation of color has been known as a cue to distance since Leonardo da Vinci (aereal perspective). However, by suitable manipulation of color context, "warm" colors can be made to recede, and "cool" colors to advance. The hypothesis of psychological color temperature ("warm" and "cool" colors) is widely used, however not experimentally confirmed.

Lighter colored objects have been found to appear larger and closer (which would constitute somewhat of a contradiction between the size-distance cue and the aereal-perspective cut to distance.)

Darker colored objects appear visually to be heavier than lighter colored ones, although they are identical in size, shape, and weight.

There appears to be substantial evidence that color is one of the determinants of attention (as measured by duration and frequency of eye movement or fixation and other responses). Indication of this fact has been found in infants. Why chromatic and "warm" colors seem to have more impact (as advertising practice confirms) has not yet been explained. Conceivably, warm colors appear less often and in more concentrated form in the blue and green environment of nature and will thus likely be associated with something that requires action (e.g. fire). Whether such reactions are inborn or learned is hard to say and may vary from color to color and species to species.

There seems to be some evidence from advertising and experimental psychology that color enhances retention of colored features. This may, however, lead to reduction in memory value of uncolored features. Rankings of colors as to their memory value should turn out contradictory from experiment to experiment, since many variables and different kinds of tests are involved.

Many experiments with color samples agree that blue and red are the most preferred colors. The results of experiments on preference for color combinations are more confused. However, while orange or greenish color samples are often judged as unpleasant in color preference tests, few people would object to the color of a sunset or spring foliage. No color seems to be unconditionally pleasant or unpleasant.

When color samples are checked against adjective lists some fairly stable responses result. As for hue: The red end of the spectrum affects the "activity dimension," the blue end "passivity" on the semantic differential. Saturation affects the "potency" dimension ( ghly saturated colors are rated "strong," pale colors "weak"). There seems to be no stable effect of color on the "evaluation" dimension (i.e. there are no colors which are "good" or "bad" per se).

While these results seem to be relatively stable, there are still many contradictions among the associations between colors and adjectives. Also, it seems that certain responses can be conditioned to colors and then generalized to words or other colors.

Practitioners in art, advertising and the audio-visual field have advanced a variety of techniques to induce predictable reactions in their audience.

Few of these practices are tested and many of them are obvious. Thus, unity may be established by tending toward monochrome compositions, while contrast in brightness or hue serves to accentuate differences. In the absence of experimental results there is often no other choice than adoption of traditional color practices.

There is some evidence that in communication by pictures color should be used "realistically." Non-realistic use of color decreases the communication potential of pictures, at least in audiences of low educational level. Conceivably this fact could be linked with the lack of meaning stability of color or the "evaluative" dimension ("good," "bad") of the semantic differential: A purple cake-mix or a purple horse is not meaningful and therefore not "good."

There is considerable evidence that color coding improves performance in visual search, identification, etc. It must not be overlooked, however, that about 12% of the population is affected by various kinds of color blindness of colors (10-12). Well-established color codes should be respected.

Black and white tones can suggest differences in hue. Only certain colors reproduce faithfully in slide projection.

The new thinking behind the latter type of hypothesis has been stimulated by the advancement of new statistical and computer techniques.

A study on preferences for fair exhibition topics may illustrate this new trend of investigation. For the design of a science pavilion, forty exhibition topics were selected from a list compiled by a scientific committee. These topics were mimeographed on the back of prepunched IBM cards. In addition, a questionnaire for demographic data and popular preferences for specific exhibition techniques was devised. People were approached near the main gate of a World's Exhibition and asked to rank the cards in terms of their personal interest in the topics. From "most interesting" to "least interesting" on a particular scale. Each person also gave demographic information (age, sex, occupation, etc.) and expressed his preference for exhibition techniques. The forty proposed exhibition topics received thus, a particular score from each subject. Later the ranking patterns of all subjects were compared by feeding the IBM cards in a computer which was programmed to detect similar patterns. The computer detected two main types of ranking patterns. One type revealed a strong interest in scientific topics couched in everyday human interest terms and rejected topics of mechanical content. The other type preferred a selection of more mechanical topic rejecting historical and people oriented themes. Upon inspection of the demographic data it became evident that the first type was constituted mainly by female fair goers, while the second type was predominantly male. All fair goers alike, however, seemed to prefer the same display techniques: Mock environments to walk through, moving displays and displays they could operate.

The same forty topics and questionnaires were given to a group of designers and scientists. These two groups were asked to rank the topics "as they thought that fair goers would rank them in terms of interest." Since the same IBM cards and the same ranking procedure and scale was employed the sorting patterns of the designers and scientists could be compared by the same computer technique with the sorting patterns of the fair goers.

Interestingly enough, these professional "arbiters of preference" did not guess the interest of the fair goers (although they had been instructed to do so). Designers fell into a sorting pattern which ranked spectacular topics high, with other words they sorted the topics according to the criterion, which ones would make for a "good" exhibition or show (where "good" was defined in their own terms). Both designers and scientists correlated especially low with the female interest type (with exception of one of the three female designers participating in the study). As for exhibition techniques, designers, scientists, and fair goers were at odds on various accounts. Most obvious was the difference with respect to projected images (both film and slides) which were overrated by the designers.

This study illustrates nicely that it is to the designers own advantage to base his decisions on specific data obtained from the "consumer" of his products and that "professional experience" is not necessarily a good substitute for such data. The argument that similar investigations are too time consuming and costly do not hold, at least in this case, since the study was prepared and carried out in three days and its cost was negligible when compared with the total investment in a fair pavilion.

## Conclusion

If one asks about the use of applying psychology in design, two major conclusions can be drawn from what has been said above. Aside from theoretical interest in the process of creative thinking it is useful to know about the creative person (the designer) in his interaction with organizations. Each "design stiuation" is constituted by the designer of a commissioned system (often assisted by designers of elements of that system) and the system's sponsor. The more one knows about the behavior of the designer and the sponsor the less likely the communication between the two will break down during their common venture in a project and the more staisfactory the "design situation" will be for the people involved in it.

As for the study of the client or consumer, the benefits appear to be quite obvious. However, how many designers are really interested in the behavior of man for whom they design? How many designers planning an office or a hotel, etc., are asking themselves who are the men and women coming to work, to live part of their lives in these environments? What are they really doing in these environments? What is their background? What are their physical and psychological needs? Unfortunately, there are not too many data available and it will be necessary to pioneer studies in many situations. But some of the studies on the environment of fighting ships or computer installations have lead to new and interesting concepts for the design of ship's bridges or computer control rooms. One would expect that an intensive study of the behavior of man in the office, in the hotel or in any other environment should lead to new and more satisfactory concepts in space planning and environmental design. Design in itself will become more and more an interdisciplinary science.

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# SEMIOTIC AND COMMUNICATION

## I. History of the terminology

The earliest use of the term semiotic was limited to the medical theory of symptoms. A symptom was a sign of sickness and these signs were emitted either voluntarily or involuntarily by the patient in his interaction with the doctor (Ostwald, P. F., 1964). By the end of the 17th century it seems to have been introduced into philosophical language by John Locke. For John Locke, semiotic was the doctrine of signs, "the business whereof is to consider the nature of signs the mind makes use of for understanding of things or conveying its knowledge to others." (Sebeok, T. A.; Hayes, A.S.; and Mary Catherine Bateson, 1964, p. 5)

However, the pioneer of a systematic science of signs is the pragmatic philosopher Charles Sanders Peirce. In a letter to Lady Welbey he remarks that the study of meaning, Significs, would appear from its name to be a part of Semiotic which inquires into the relation of Signs to the Interpretants (for which, as limited to Symbols, I proposed in 1867 the name Universal Rhetoric)." (Ogden, C. K. and Richards, I. A., 1946, p. 281, 282) Somewhere else (Hartshorne, C. and Weiss, P., 1960, p. 488) Peirce declares himself "a pioneer, or rather a backwoodsman, in the work of clearing and opening up what I call semiotic.... and I find the field too vast, the labor too great for a firstcomer." In his 1938 paper "Foundations of the Theory of Signs" Charles W. Morris (1938) declares that "Semiotic has a double relation to the sciences: It is both a science among the sciences and an instrument of the sciences. The significance of semiotic as a science lies in the fact that it is a step in the unification of science since it supplies the foundations for any special science of signs, such as linguistics, logic, mathematics, rhetoric, and (to some extent at least) aesthetics." In a similar vein, Rudolf Carnap (1942) wrote four years later: "The whole science of language is called semiotic." Charles W. Morris, after a period of study with two eminent American learning theorists, Edward C. Tolman and Clark L. Hull, elaborated his concept of semiotic further in the book "Signs, Language, and Behavior." (1946)

The terminology elaborated by Morris has essentially not been challenged until Margaret Mead at the Indiana Conference on Paralinguistics and Kinesics in 1942 proposed the plural term "semiotics" (perhaps analogous to Morris's use of the plural in semantics, syntactics and pragmatics) as an umbrella term covering the study of communication in all its forms, from language to gesture or any other modality in which culturally defined human interaction may take place (Sebeok, T. A.; Hayes, A. S.; and Mary Catherine Bateson, 1964, p. 5).

The term semiotic has thus developed in two phases. First, the problem of signs was regarded as subject matter of philosophy of science. A language to talk about language and signs was elaborated. Then, in its plural version semiotics became a problem of empirical science, unifying various terminologies and methodologies which had been developed to classify and explain human communication behavior.

II. Semiotic - a language to talk about signs

a) The work of Charles W. Morris

1) Signs

If a graphic sign of a street curve is presented to an automobilist on a traffic sign, his driving behavior can be affected before he has actually reached the street curve; he may slow down and get ready to negotiate the curve efficiently. This example illuminates the rather complicated definition of the term "sign" which Morris has given. He defines a sign (e.g., highway sign) as a stimulus, which stands for another stimulus not present at the moment (e.g., the highway curve); the the sign-stimulus (e.g., highway sign) affects the behavior (e.g., slowing down) of its interpreter (e.g., automobilist) in some kind of a relation to the absent stimulus (e.g., anticipation of the danger related to highway curves).

How and to what extent a (graphic) sign affects the behavior of its perceiver has been subject of much controversy. Obviously the perceiver of a graphic sign for the "real thing" fire, does not necessarily respond overtly to the graphic sign as he would respond to the fire itself (e.g., by running away). The difficulty in psychology so far has been to account for the whole spectrum of observable reactions to (graphic) signs by a single theory.

Now consider three different graphic signs: The letter "a," the silhouette of a walking man (as in European traffic signs), and a dollar sign. They are obviously different and we must be able to label them differently if we want to differentiate them.

When we write an "a," or any other letter, we produce graphic signs which take the dimension of speech sound into account. Such signs are called "phonograms" (Maldonado, T., 1962). Since the silhouette of the walking man and the dollar sign do not have the property of standing for speech sounds, they form a class of their own called "logograms." When a designer works with this class of signs, he says that he is designing a "logo." Since logograms are independent of speech sound, they have the important property of communicating across language barriers. There are, however, obvious differences between the silhousette of the walking man and the dollar sign. The former refers to the "real object" by resemblance. Signs of this kind are said to have "iconic" properties and are a called "pictographs." The dollar sign, also independent of speech sound, but not "iconic," belongs in the class of "diagrams."

2) Symbols

There is still one further distinction between graphic signs for which a proper term should be used. When a political cartoon portrays the Republican party as an elephant or the British Empire as a lion, the cartoonist makes use of pictographs. However, there is a difference between the pictograph of the walking man and the pictograph of the elephant as used in the cartoon. Granted, the pictograph of an elephant could just be used in the same way as the pictograph of the walking man. But in this case it stands for an animal which in turn stands for a political party. This kind of a graphic sign is called a "symbol." A symbol is a kind of sign which is substituted for an object (e.g., the elephant) but that object in turn stands "indirectly" for another object (e.g., the Republican party).

In this example, the sign is "indirectly" related to the second object (e.g., Republican party). Therefore, it is called an "indirect symbol." But when we use the pictograph of a snail to symbolize "slowness," we refer directly to a property of the snail and not indirectly to another object. Therefore, this graphic sign is called a "direct symbol."

The designer should use indirect symbols only in the case where he is sure that his audience is familiar with the indirect relationship between the primary and secondary objects. Direct symbols are perhaps, a little more effective when a universally known property of an object is symbolized by the object. Everybody who has observed a snail knows that it is slow. But a snail is also "defensive" and "slimy," etc. Not many people would necessarily think of "slowness" if they see a pictogram of a snail. When a symbolism is not collectively established in people's mind, we talk about "quasi-symbols."

However, sometimes a symbolism is fairly well established within a given culture or society (as in the case of the Republican elephant or British lion). In such a case, we talk about "symbols" proper. Most people are not even aware of the fact that there is a triple relationship between the pictogram cross, Roman instrument for death penalty, and Christianity. The cross has totally assumed the "meaning" of Christianity. In this case, where a symbolism is rigidly conventionalized, we talk about "emblems." Among quasi-symbols, symbols, and emblems, the latter are least likely to be misunderstood but convey also very little information. There is nothing "new" about emblems.

3) Signals

A signal is a state of energy transmitted from one physical system to another. For example, the duration an electric circuit is open or closed (long,short) by a telegraph key produces energy states called signals. Signals can become "carriers" for signs as the example of the telegraph demonstrates. For the purpose of graphic information and persuasion, the term signal is less important than the terms sign and symbol.

4) Semantics, syntactics, pragmatics

In addition to developing definitions for various classes of signs, Charles Morris is the author of the famous subdivision of semiotic in semantics, syntactics, and pragmatics. The discipline of semantics describes the relationship between a sign and its referent object (i.e., the "meaning" of the sign). Syntactics is the discipline investigating the relationship between sign and sign (i.e., answering the question by which rules several signs can be combined to form a compound sign, as words combine into a sentence). Pragmatics is the branch of semiotic having to do with the relationship between sign and sign maker or sign and sign user (i.e., what is the origin and the effect of a sign).

Furthermore, Morris has distinguished between pure, descriptive, and applied semiotic. Pure semiotic is the discipline in which the metalanguage to talk about language is elaborated. The study of actual signs is carried out in the discipline of descriptive semiotic. Finally, applied semiotic is the application of knowledge about signs for practical communication purposes. In this sense, graphic design should be a branch of applied semiotic.

b) Morris criticized
  1) The indictment of "mentalism" (Osgood, C.E., 1953)
  Morris has been criticized by various authors of not spelling out with sufficient clarity how the semantic (sign to referent) relationship comes about.

## The Meaning Of Pictures

Meanings are found in people, not in words or pictures. The word "meaning" seems to have many meanings. Consider the following phrases:

a) To use words properly you must know what they mean.

b) The purpose of some pictures is to communicate meanings.

c) The sky is cloudy. That means rain soon.

d) In English, the letter "s" at the end of a noun usually means "more than one" or plural.

e) My family means more to me than my profession.

f) Pictures do not have meaning - only people do.

The word "meaning" does not seem to be used in the same way in these sentences. What seem to be the different implications?

For instance sentence

a) implies that meanings are properties of words.

b) implies that one state of affairs leads to another (clouds to rain).

c) implies the feelings of a person when he compares his family with his job.

d) implies that meanings are not in messages, pictures, or words but that meanings are found in people.

## How Are Meanings Learned ?

Meanings are taught in a child by showing the child an object and giving it a name. When the child hears the name again it triggers off in the child some internal process which makes the child pick up the object named.

The same behavior pattern can also be triggered off by pictures.

What kind of stimulus is a word or picture? The observation of the object is the first stimulus. The retina is fired in a certain pattern. It makes the sense cells of touch fire in a certain frequency. All the data from the various senses are integrated by the brain. When the object is named another kind of stimulus is involved. On hearing the name, a person acts with respect to the object.

A picture is only a deposit of colors on a canvas or a set of halftone dots printed on paper. Pictures in themselves are meaningless. Obviously then, meanings are in people. They are processes going on within the human organism. They are personal. They are learned. There seems to be a way of splitting up all the stimulus patterns of the world into two categories: Those patterns which stem directly from an object and those patterns which are a sign for something else which is not present at the moment (the name of the object).

The latter type of stimuli are called signs. All words and pictures, all messages in communication are signs. Object patterns of stimulation are designated with the symbol $\dot{S}$, and sign patterns of stimulation with the symbol $\boxed{S}$. The science of meaning then could also be called the science of signs.

## Various Theories In The Science Of Signs

Idealistic Theory: In their book, The Meaning of Meaning, Odgen and Richard develop the following theory of meaning: The perception of the cat by sight and touch would lead to the "idea" or "image" of the cat in the child's mind. The name cat leads to the same idea in the child's mind. If the phrase "leads to" is substituted by an arrow one could write this theory in short form

$$\begin{tikzcd}
\dot{S} \arrow[dr] & \\
& \text{idea} \\
S \arrow[ur] &
\end{tikzcd}$$

This theory has been criticized because it does not explain what an idea is. Before one can explain the sign process it must be known what the term "idea" really stands for.

The Substitution Theory: This goes back to the Russian psychologist Pavlov, who in turn influenced the U.S. psychologist Watson. These psychologists say that signs achieve their meaning by being conditioned to the same reactions which were originally made to the object itself. In Pavlov's experiment the food in the mouth of the dog was the object stimulus which lead to salivation. Every time the dog was given food a bell was rung. After sufficient repetition of this procedure, the dog would salivate at the mere ringing of the bell. The ringing of the bell had become a substitute for the food, it meant "food" for the dog. If the symbol R is introduced for the reaction of the dog (salivation), this theory in the short form would be:

$$\begin{tikzcd}
S \text{ (food in the mouth)} \arrow[dr] & \\
& R \text{ (salivation)} \\
S \text{ (bell)} \arrow[ur] &
\end{tikzcd}$$

This theory has been criticized on the grounds that one almost never reacts to the sign as one reacts to the objects they represent.

## The "taking account of" theory

Morris, in his 1938 "foundations of a theory of signs" says that signs achieve their meanings by eliciting reactions that "take account of" the objects signified.

$$\dot{S} \longrightarrow R$$

$$S \longrightarrow R_x \text{ ("taking account of" } \dot{S}\text{)}$$

But what is "taking account of"? Osgood criticizes this early position of Morris in putting it on the same level as the idea theory of Ogden and Richards.

## The Disposition Theory

This was formulated by Morris after he had studied with the U.S. learning theorists Hull and Tolman. Morris defined the sign process now as follows: We can make many responses to an object stimulus. If it is a hammer, we may grasp or pound. Any other stimulus which leads to a disposition in us to some kind of attitude or readiness to make any of the responses which we previously made to the object stimulus (e.g. hammer) - that stimulus is a sign. Thus the word "hammer" or the picture of a hammer, according to Morris, leads to a disposition in a person to react overtly by grasping or pounding. This theory in short form is written:

$$\begin{array}{l} \dot{S} \xrightarrow[\text{disposition}\nearrow]{\qquad\qquad} R_1, R_2, \ldots R_n \\ \boxed{S} \end{array}$$

Morris accomplished what Pavlov and Watson did not in their theory. He placed the meaning process within the human organism by calling it "disposition." He could thus account for the fact that a person often does not react to the sign as he does to the object for which the sign stands. But on the other hand his theory has been criticized because the word "disposition" is merely a word, and some way of measuring or indexing what kind of a process the word "dispois ion" stands for is needed. The "disposition theory" seems in this respect not much different from the "idea" theory.

## The Mediation Theory

This theory has been laid down by Osgood. Osgood establishes a difference between the two kinds of experience with object stimuli. Stimuli can be "proximal" that is in contact with a person and stimuli can be "distal" that is at a distance. For instance, when a child is born his experience is concentrated on such proximal stimuli as skin contact with his mother or the nipple of the bottle in his mouth, etc. These proximal stimuli set up several responses. Then he perceives "distal" stimuli which appear often in connection with the proximal stimuli. For instance, there is the shape of the mother holding the bottle. The situation is somewhat similar to Pavlov's experiment where one could call the food in the mouth of the dog a "proximal stimulus" and the bell a "distal stimulus." However, the infant does not become conditioned like the Pavlovian dog. He does not make all the same responses to his mother as he makes to his bottle. Osgood suggests that only fractions of the responses made to proximal stimuli become detached and conditioned to the distal stimuli. These fractional responses are inside the organism. They are those responses that can be separated from the rest of the responses that the child makes to the proximal stimulus. They are responses that the individual can make when the proximal stimulus is not there. These internal responses in turn lead up to internal stimuli for overt actions. The internal process between the distal stimulus and an overt action is called "mediation process" because it mediates between the distal stimulus and the overt response. If one introduces the subscript P for proximal, d for distal, r for the internal fractional response, and s for the internal stimulus the theory in the short form is written:

$$S_p \xrightarrow{\text{(bottle in mouth)}} R_1,\ R_2,\ R\ldots R_n$$

$$S_d \xrightarrow{\text{(mother)}} \overbrace{r_1 r_2 r_n}\ \ldots s \longrightarrow R_a,\ R_b\ \ldots R_z$$

What has all this to do with meaning? The internal response and the internal stimulus that is set up by it is the process which is called meaning. Now this internal meaning process in the infant is at first non-verbal like "feelings." As the child perceives his mother some of the internal feelings of satisfaction he gets from the bottle become detached and become conditioned to the sight of his mother. Then the sight of his mother is often paired with the sound "mama" and thus a further conditioning takes place. Some of the internal reactions to the sight of his mother become now attached to the word "mama" and the meaning of the word (or sign) "mama" is exactly this internal process which became detached from the other internal processes (feelings) connected with the sight of the mother.

The short form of this theory is:

$$\begin{tikzcd}
S_p \arrow[rr] & & R_1,\ R_2\ldots R_n \arrow[dl, bend left] \\
S_d & \overbrace{r_1,\ r_2\ldots r_n}\ldots s \arrow[r] \arrow[d] & R_a,\ R_b\ldots R_z \\
\boxed{S} \arrow[r] & r_2\ldots\ldots s \arrow[r] & R_A,\ R_B\ldots R_Z
\end{tikzcd}$$

The same process may occur with a photograph of the mother. As one grows older and meaning processes become more and more complex and intertwined, one may also transfer part of the meaning one has for the word mother to a medieval painting of the madonna with the child.

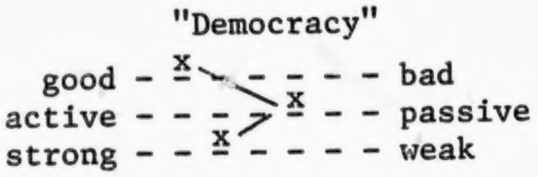
There are several implications of this theory of meaning:

1) Meanings are internal responses in people setting up internal stimuli for action.
2) People can have similar meanings only to the extent that they have had similar experiences.
3) Meanings may change in people with added experience.
4) No two people can have exactly the same meaning for anything.
5) To give people a meaning for a stimulus, it must be paired with stimuli for which they have already a meaning.
6) Meanings are something like feelings and connotations people have for a given stimulus.
7) In as far as it is possible to measure people's connotations for a stimulus, one is measuring meaning.

Osgood and his associates (1953, 1958) have developed a measuring instrument by which we presumably can measure part of the mediation process. It is called the "semantic differential" and consists of 7 point scales between contrasting adjective pairs. An example of a small set of scales would be:

good - - - - - - - bad
active - - - - - - - passive
strong - - - - - - - weak

If we take any graphic sign or work and check our feelings about it on these scales, we can construct a profile indicative of the meaning we have for this sign. For example:



The "meaning" of a word or a sign is nothing else but an internal mediation process, which is then operationally defined by checkmarks on such a set of scales.

## The Meaning Of Four Emblems

In order to demonstrate the application of the semantic differential to the measurement of meaning (connotations) in symbols, an original set of data is reported here. Seventy U.S. college students were presented on a blackboard with a "five pointed star," a "six pointed star," a "hammer and sickle," and a "swastika." They were asked to name each symbol first and then rate it separately on the following set of seven point scales:

good-------bad
pleasant-------unpleasant
valuable-------worthless
active-------passive
strong-------weak

The instruction to "name" each symbol aimed at mapping the symbols into the domain of denotative responses, i.e., to obtain the more "descriptive" meaning responses. The responses to be expected in this domain could be:

1) no response = "I don't know," etc.

2) denotative meta-linguistic - the pictorial stimulus is called with its own name "star" (five-pointed).

3) denotative symbolic = the pictorial stimulus is labelled with the name of the object it symbolizes (e.g., the swastika is labelled "Nazi Germany").

All three types of responses did occur; however, the "no response" only three times. The denotative meta-linguistic response occurred somewhat more for the "swastika" and "five-pointed star" while "hammer and sickle" and "six-pointed star" were responded to mostly in denotative symbolic terms (e.g., Communism, Judaism). Responses were counted as symbolic when both the meta-linguistic and the symbolic name were given, since this behavior indicated that the person knew the symbolic name of the stimulus. The frequencies of denotative responses are show in Table 1.

Table 1

Denotative Responses to Four Emblems

| Response Class | ☭ | 卐 | ✡ | ★ | |
|---|---|---|---|---|---|
| No response | 1 | -- | - | 2 | 3 |
| Denot. meta-ling. | 23 | 38 | 7 | 37 | 105 |
| Denot. symbol. | 46 | 32 | 63 | 31 | 172 |

The "connotative" meaning of the four emblems can be seen from the response frequencies in the following five tables. Table 2 compares the response frequencies on the "good-bad" scale (evaluation dimension of meaning).

### Table 2
### Connotative Responses on the "Good-Bad" Scale

| Emblem | Good | +3 | +2 | +1 | 0 | -1 | -2 | -3 | Bad |
|---|---|---|---|---|---|---|---|---|---|
| ☭ | | 6 | 6 | 2 | 10 | 5 | 20 | 21 | |
| 卐 | | 6 | 4 | 2 | 9 | 5 | 5 | 40 | |
| ✡ | | 26 | 15 | 9 | 19 | 1 | - | - | |
| ★ | | 27 | 23 | 7 | 12 | 1 | - | - | |

Table 2 shows that the "swastika" has worse connotations attached to it than "hammer and sickle," while the "five-pointed star" (often labeled U.S.A. or Christianity) is slightly preferred over the "six-pointed star" (often labeled Star of David). Both stars have almost no negative connotations on the "good-bad" scale.

Table 3 compares the response frequencies on the "pleasant-unpleasant" scale (evaluation dimension of meaning).

### Table 3
### Connotative Responses on the "Pleasant-Unpleasant" Scale

| Emblem<br>Pleasant | +3 | +2 | +1 | 0 | -1 | -2 | -3 | Unpleas. |
|---|---|---|---|---|---|---|---|---|
| ☭ | 1 | 1 | 3 | 15 | 7 | 21 | 22 | |
| 卐 | 2 | 3 | 4 | 5 | 6 | 4 | 46 | |
| ✡ | 19 | 14 | 12 | 23 | 1 | - | 1 | |
| ★ | 31 | 18 | 14 | 7 | - | - | - | |

Table 3 shows that the "swastika" is rated much more "unpleasant" than "hammer and sickle," while the "five-pointed star" has more pleasant connotations attached to it than the "six-pointed star."

Table 4 compares the response frequencies on the "valuable-worthless" scale (evaluation dimension of meaning).

### Table 4
### Connotative Responses on the "Valuable - Worthless" Scale

| Emblem | Valuable | +3 | +2 | +1 | 0 | -1 | -2 | -3 | Worthless |
|---|---|---|---|---|---|---|---|---|---|
| ☭ | | 10 | 10 | 12 | 20 | 5 | 8 | 5 | |
| 卐 | | 8 | 7 | 16 | 16 | 3 | 3 | 17 | |
| ✡ | | 17 | 17 | 15 | 17 | 3 | - | 1 | |
| ★ | | 22 | 11 | 14 | 17 | 3 | 1 | 2 | |

Table 4 shows that the "swastika" is felt to be more worthless than "hammer and sickle." In fact, "hammer and sickle" has some valuable connotations attached to it. Again, the "five-pointed star" seems to be perceived as slightly more valuable than the "six-pointed star." Since the "good-bad," "pleasant-unpleasant" and "valuable-worthless" scales are typical for the evaluation dimension of meaning, we can now almost establish a rank order (or predict preferences) for the four emblems. As far as evaluative meaning is concerned, the "five-pointed star" seems to rank highest, while the "six-pointed star" seems to rank second. "Hammer and sickle" has bad evaluative connotations attached to it, but not as bad as the "swastika."

Table 5 compares the response frequencies on the "active-passive" scale (activity dimension of meaning).

Table 5
Connotative Responses on
the "Active-Passive" Scale

| Emblem | Active | +3 | +2 | +1 | 0 | -1 | -2 | -3 | Passive |
|---|---|---|---|---|---|---|---|---|---|
| ☭ | | 39 | 15 | 9 | 3 | 3 | - | 1 | |
| 卐 | | 36 | 14 | 7 | 6 | 4 | 2 | 2 | |
| ✡ | | 16 | 19 | 13 | 10 | 5 | 4 | 3 | |
| ★ | | 17 | 16 | 10 | 17 | 4 | 3 | 3 | |

Table 5 shows that "hammer and sickle" and "swastika" have a more active connotation attached to them than both "five-pointed star" and "six-pointed star."

Table 6, finally, compares the response frequencies on the "strong-weak" scale (potency dimension of meaning).

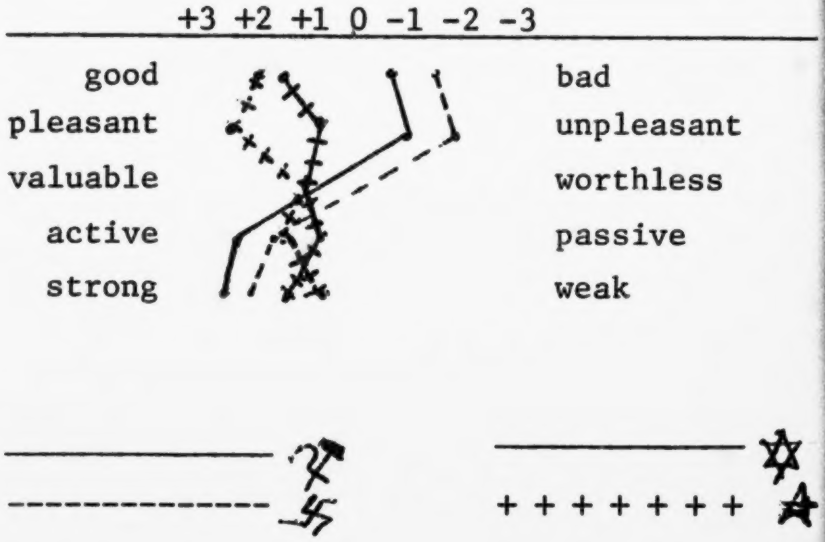
Table 6
Connotative Responses
on the "Strong-Weak" Scale

| Emblem | Strong | +3 | +2 | +1 | 0 | -1 | -2 | -3 | Weak |
|---|---|---|---|---|---|---|---|---|---|
| ☭ | | 41 | 19 | 6 | 2 | - | - | 2 | |
| 卐 | | 44 | 11 | 5 | 6 | 1 | 1 | 2 | |
| ✡ | | 23 | 20 | 11 | 8 | 5 | 2 | 1 | |
| ★ | | 21 | 11 | 13 | 18 | 4 | 1 | 2 | |

Table 6 shows that "hammer and sickle" and "swastika" have more connotation of strength attached to them than both "five-pointed star" and "six-pointed star."

The meaning pattern across the dimensions for these four emblems seems to suggest that the "good," "pleasant," and "valuable" is felt to be less "active" and "strong" (less agresssive?), as shown in table 7.

Table 7
Average Connotative
Responses on all scales



### The "Surrogate" - an artificial kind of sign (Gibson, J.J., 1954)

The terminology of Morris and the semiotic school has also been criticized because the term "sign" is too broad and a more specific term is needed to delineate the field of communication (Gibson, J.J., 1954). While visual communication by pictures is obviously different from verbal communication, there are aspects in which both are alike. Both convey second-hand experience. The receiver of the communication is not himself aware of the ideas or objects the sender is aware of. He is being made aware of ideas or objects which another person experiences. Verbal and pictorial messages alike are vehicles for this kind of indirect perception. Thus, a writer can make the reader see, hear, and feel with words what he has experienced, similarly as a painter can do with his pictures. Both present us with "surrogates" for direct experience.

A surrogate is defined as "a stimulus produced by another individual which is relatively specific to some object, place, or event not at present affecting the sense organs of the perceiving individual." An important feature of this definition is that it accentuates the "artificial" man-made character of the surrogate. The definition of "surrogate" also states that there must be a one to one relationship between the surrogate and its referent, whether the objects be places or events or abstract ideas.

There are two kinds of correspondence between surrogates and their referent objects. First, surrogates may be arbitrarily paired with an object and the correspondence is valid by convention among a group of people. For example, the letters T, R, E, E, are for all people who agree upon using the English language for communication, a surrogate for the object tree. This type of surrogate is called "conventional." Second, the surrogate may correspond to an object by "projection." In this case, correspondence rests upon the fact that the pattern of light rays reflected from the real object onto the retina of the eye is equal or similar to the pattern reflected from the surrogate. If a sheet of glass is placed in front of a tree, the outline of the tree can be traced on the glass and we may preserve it as a surrogate for the object tree. Since both patterns of reflection are similar, they can be interpreted in the brain as meaning the same thing. This type of surrogate is called "non-conventional" or visual.

Conventional and visual surrogates can be relatively unspecific with respect to their referents. Language and pictures may be "ambiguous" and hence the resulting second-hand experience of the receiver will be ambiguous. Pictures are said to have more or less "fidelity," words may have a "double meaning."

Conventional and optical surrogates can be relatively unspecific with respect to their referents. Language and pictures may be ambiguous" and hence the resulting second-hand experience of the receiver will be ambiguous. Pictures are said to have more or less "fidelity," words may have a "double meaning."

"Mixed" surrogates combine the properties of both conventional and optical relationship. They are specific to their referents partly by virtue of agreement and partly by virtue of "fidelity." An example of "mixed" surrogates can be seen in picture writing, (e.g., Chinese characters) or in more or less conventionalized pictographs. Typically, they can be put together into words and sentences or "scenes," as a montage of conventionalized pictographs from European road signs may prove.

What is the implication of the difference between conventional and non-conventional surrogates? Designers seem often to attach a particular magic to pictorial communication. One picture is said to be worth a thousand words. Has pictorial communication advantages over verbal communication?

Pictorial communication by its very nature of non-conventionality must require a somewhat different reinforcement process than verbal learning. Children learn to speak when they make more and more "correct" verbal responses in the presence of objects or other stimuli. After "correct" utterances have been shaped gradually through reinforcement by the language community, especially the parents, they are able to use and respond to "words" as if they were in contact with an environmental stimulus. This type of learning by reinforcement through the language community can be skipped, at least partially, for pictures. Pictures and models are closer approximations to direct perception than words and symbols. Learning to act differently in the presence of different objects or object features is not always due to reinforcement by the language community, but due to reinforcing circumstances in the non-human environment. Thus, differential responses to different pictures could be - at least in part - reinforced by non-human stimuli. A recent study of a 19-month old child by Hochberg (1962) adds to this evidence. The child had been taught words for certain objects, such as a doll, a shoe, a key, etc. The child had never seen any pictures close at hand. Yet, when he was presented with photographs and outline drawings of these objects, he recognized them and was able to name them.

There are persisting anecdotes of primitive tribesmen who are not able to recognize photographs of their family members and friends, which could be used as contrary evidence. But it may be that this inability is simply a matter of scale of the photographic reproductions of people. Perhaps they would have the same difficulty in identifying a family member or friend from a realistic miniature sculpture. As far as scale is concerned, a normally viewed small photograph is, in fact, more a surrogate for a realistic miniature than for a full-size person.

If "correct" response to pictures are learned under somewhat different circumstances than correct responses to words, this may lead to the speculation that there are also inborn physiological mechanisms at work when we respond to a picture. Whatever learning process plays a role in visual communication, it seems to be more complex than verbal learning and might go far back into the childhood of the individual. One would probably be correct in assuming that inborn physiological mechanisms are involved as well as differential reinforcement by non-human and human environment. What these physiological mechanisms might be like will now be discussed.

To sum up: Words and pictures are alike in that they are surrogates providing second-hand experience of objects or events, but they are different in that verbal language is learned by reinforcement through a verbal community while pictorial language is not learned in that way.

## The perception of outline drawings

What are outline drawing? What process makes us take a line on paper as a surrogate for the edge of an object? What is the edge of an object? An edge is the abrupt end of an object surface situated at a certain distance from the observer's eye. That means that edges of other objects must be situated at larger distances from his eye, in the space behind the first object.

Imagine for example, a cutout silhouette of a single pine tree mounted vertically on a plan as in a stage "flat." Past the edge of that silhouette there is physically nothing in the same plan. The material of the stage floor and backdrop which is seen at both sides of the silhouette must be at a greater distance. It extends behind the cutout.

Now visualize the silhouette of the pine tree printed on white paper. This silhouette provides the eye with the same optical situation as the stage flat in front of a white backdrop.

Thus, a silhouette on paper is a surrogate of reasonably high fidelity for the edges of a flat object mounted on a plan in front of a background.

But what about an outline drawing of a pine tree on paper? Is it possible to construct an arrangement of objects in space which sets up the same optical situation as an outline drawing? Imagine again the stage with the black cutout of the pine tree against the white backdrop. Now we prepare another cutout of the pine tree, slightly smaller than the first and made of white material (e.g., masonite painted white). We place the white cutout at some distance in front of the black cutout. The black edges remain still slightly visible because the white cutout is smaller. Under certain viewing conditions this multiple level cutout will not be spontaneously recognized as a spatial arrangement. People will perceive it as a black outline picture of a pine on a white background.

Edges of objects in space and silhouettes or outlines on paper have one important feature in common: Where they finish a more or less abrupt change in luminosity takes place. Each time our eye is confronted with a sufficiently sharp break in luminosity, we have the tendency to see the edge of a surface. This mechanism of perception is the reason why silhouettes and outline drawings can be used as surrogates for the spatial arrangement of (flat) objects.

Whenever we see object shapes, we see them because they are edged and whenever we see edges we attribute them to one object only. It is characteristic of edges that they belong as object boundaries only to one surface in one direction at a time. If one of two adjoining regions has a recognizable shape, the shape of the other is lost. But it is possible that a contour becomes a surrogate for either of two edges. When two adjoining regions both have a recognizable shape the edge may belong to either shape and give rise to so-called "reversible figures." Also, edges seem to have only a limited "sphere of influence" within which they determine the perception of the direction into which a surface extends. Past that sphere of influence two edges opposite in sign will force the observer to sudden reappraisals of his distance from the object (Penrose & Penrose, 1958). Thus, contradictory perceptions may be experienced as in so-called "impossible objects."

In order to be efficient in visual communication the designer's job is nothing more or less than to "predict" which edge will be perceived as belonging to which surface. This is not merely a matter of which shape is the more familiar one. In the classical reversible figure we are familiar with the shape of a face as well as with the shape of facial profiles. It is the entire configuration or organization of the picture (the "Gestalt") which determines what will be perceived as figure and what as ground. In this sense the production of a visual message can be called "Gestaltung," that is "bringing about a predictable configuration." It may be of historical interest that the first Bauhaus in Germany printed as a subtitle on its letterhead the words, "Hochschule fur Gestaltung" which means literally "College for Configuration."

The Gestalt theory of perception suggested in its laws of grouping a set of intuitive rules for visual communication. For instance, proximity and similarity of shapes or objects will group them together for the perceiver. Another of these rules was: Where more than one organization could be perceived, the observer will see the simplest alternative. This has been called the "law of simplicity." The trouble with Gestalt theory is that it provides only intuitive statements and demonstrations, while scientific "laws" should be based upon quantitative measurement. There is some beginning, however, in quantifying Gestalt hypotheses. Information theory with its concept of redundancy seems to provide a promising starting point. "organization (=Gestalt) and "redundancy" as used in information theory, seem to be parallel concepts. We could thus predict that the probability of a given perceptual response to a stimulus pattern is an inverse function of the amount of information required to define that pattern. For instance: The degree to which each of a series of different drawings of an object is perceived in its solid rather than flat alternative is proportional to its complexity as a flat pattern. The more angles and lines must be perceived in a flat pattern, the more complex it becomes and the more likely the perceiver chooses the simpler alternatives of seeing it as a volume or solid (Hochberg, 1962).

To sum up: Silhouettes and outlines can be high-fidelity surrogates for edges of surfaces in space. The reason is that both edges and silhouettes or outlines produce an abrupt change in luminosity at their boundaries. This common feature sets the figure off from the background. Where outlines may pertain to more than one surface, "reversible figures" result. The Gestalt law of "simplicity" is a quantifyable predictor of what alternative is likely to be perceived in an ambiguous stimulus pattern.

## The perception of photographs and paintings

We have seen how outline drawings can work as surrogates for surfaces overlapping in space like stage "flats." But photographs and most pictures function as surrogates for solid voluminous objects and real scenes. The question is then what are the optic features produced by scenes of solid objects which can also be produced by the dappled surface of a half-tone or shaded picture?

Most surfaces of objects and scenes in our environment have a texture which is more or less uniformly distributed. When we stand in front of a plowed field, we see a texture of earth crumbs, coarse in the foreground where the distance from the eye is short and tapering off finer and finer as the distance increases. This gradient of texture density is projected onto our retina producing a gradient of retinal stimulation. Thus, as lines with their abrupt changes in luminosity trigger the perception of edges, texture gradients characterize the perception of spatial arrangements of surfaces. They provide us, by means of their retinal projection, with information on this spatial arrangement - on what is far away and what is close - and about the relative size of the objects.

Texture gradients can be produced with great fidelity by pictorial surrogates, especially by photographs. They eye could almost be "fooled" into taking a dappled surface for three-dimensional space, if we were able to remove certain cues which remind us that we look at a picture, e.g., its frame or edges.

Objects in our environment are also differently oriented with respect to natural or artificial sources of illumination. They will thus exhibit shading on their surfaces and will cast shadows. The optic characteristics of shading and shadow again can be produced by pigment density in a in a painting or photograph (after Hochberg, 1962).

If we look at the corner of a cube facing us, we look at an edge facing in two directions simultaneously. Such an edge can be simulated by lines on paper, (after Hochberg, 1962). The edge of a curved surface will produce a correspondingly bent contour on our retina and a suitably drawn line can form a surrogate for it (after Hochberg, 1962).

In addition there are other retinal cues for depth in space which can be artificially produced in surrogates. Most of these cues were in fact used by artists long before they were intellectualized by the artsits themselves, or by scientists. The first artist to speculate scientifically about depth cues was Leonardo da Vinci. At least four of these "classical depth cues" should be mentioned: Size, overlay, linear perspective, and color.

a) Size. Our discrimination of depth in space and of the relative distance of objects depends on the size of the retinal projection provided by the objects. The larger object is perceived as the closer one.

b) Overlay. Our discrimination of depth in space and of the relative distance of objects depends on which object overlaps which in the projection on the retina. The overlapping object is perceived as closer than the overlapped one.

c) Linear Perspective. Our discrimination of dpeth in space and of relative distance of objects depends on the laws of linear perspective. The same distance between two points in space subtends a smaller and smaller angle at the eye as the points recede in space.

d) Color. Our discrimination of depth in space and of the relative distance of objects depends on the color of the objects projected on the retina. The more a color approximates the color of the background, the more it recedes toward the background. The more a color differs from the background, the more it stands out from the background. As a rule of thumb, but not without caution, one would recommend the principle used by painters: Warm, saturated, bright colors approach, while cold, unsaturated, dark colors recede.

Since we are surrounded by unhomogeniously textured and shades surfaces such as stone walls, veined marble, clouded skies, etc., we are surrounded by potential pictures. A selection from all the dappled surfaces which nature produces could theoretically furnish us with surrogates for any conceivable object or scene we might want to portray. A photographer may seek out a cloud formation which represents parts of an architecture or a human body. The same mechanism is also at work when we look at the famous Rohrschach inkblots or at some forms of abstract painting. The effect of these pictures is produced less by the activity of the creator-encoder, than by the intention and selective attention of the viewer-receiver (Hochberg, 1962).

To sum up: Texture gradients, shading and shadows, edges and bents, and classical depth cues such as size, overlay, linear perspective, and color can be artificially produced to fool the eye into accepting a surrogate for a real scene in the environment. A selection from all dappled surfaces in the environment could furnish us with surrogates for any conceivable object.

## The perception of models and mockups

Gibson (1954) defines a model as a "physical object whose various surfaces have the same dimensions as the corresponding surfaces of the original object, and hence are geometrically congruent with them, but which is made of a different substance than the original."

A good example for this definition is the 1:1 model which the architect Mies van der Rohe had made out of wood frames and painted canvas at the site of the actual building. In industrial design mockups or prototypes may even consist of the same material as the object for which they are surrogates.

Scale models preserve the proportion of dimensions in minor scale. But they will under optimal conditions still produce a retinal projection identical with that of the original object and can become visually indistinguishable from it.

The criteria of fidelity in a model are shape, proportion, motion, size, color, texture, etc. Theoretically, the simulation of the real situation can be elaborated indefinitely, but if the purpose is a visual surrogate, it becomes often more economical to utilize a picture or movie instead of a model.

The receiver of the visual message needs not to perceive all the properties of the absent situation. Only the ones relevant for its future behavior are significant. In this sense, distortion and exaggeration may become a method in visual communication. During the war, scale models of aircrafts were used in teaching aircraft recognition. It was found that distortions exaggerating the unique or characteristic feature of a given type of airplane improved somewhat the learning of identification. Similarly, distortion and exaggeration are used in caricatures.

To sum up: The fidelity of a model consists in a geometrical congruence of its surfaces with the surfaces of the "real" object. Its fidelity can be elaborated indefinitely until the surrogate becomes a 1:1 replica of the object it stands for. Exaggeration of relevant dimensions can become an important tool in visual communication.

# COMMUNICATION BY PICTORIAL SIGNS AND SYMBOLS

Semiotic philosophy has given us the necessary definitions of those signs which do or do not refer to the sound of speech. Perception psychology has taught us why man-made marks on paper are accepted by other human beings as substitutes for real things (located in physical space).

The application of visual communication is today more wide-spread than ever. Pictorial signs can be used to teach language to children, to communicate helpful information across language barriers to people in so-called underdeveloped countries, to persuade the sophisticated urbanite to choose brand X rather than brand Y. These are only a few examples of areas in which communication by pictorial signs and symbols is actually employed. The question for the graphic designer is when and how to apply pictorial signs in preference to typographic messages. The old saying that one picture is worth a thousand words is certainly not a sufficient rationale to make these decisions affectively. Moreover, once a decision has been reached to use pictorial signs or symbols, the design itself becomes a problem. How much detail should a pictograph contain? What graphic technique should be used for a new symbol? Is the symbol "strong" enough to communicate in situations of "visual noise"? Some of these questions have been studied and the result of these studies can be of use to the graphic designer.

a) Advantages and limits of communication by signs and symbols

Suppose the problem is to communicate to a foreign rural population of low literacy, techniques, and concepts to help improve its agricultural or hygienic situation. Unless a large staff trained in the language of this audience is available or the people can be exposed to mass media (such as radio and television), the only communication possibility is pictures. Dissemination of printed literature would be useless. It would be similarly useless if we would try to teach reading to first graders by printed instructions.

The advantage of pictorial signs in such a situation are self-evident. But what are the limits?

In the early fifties, the question of international communication between the U.S. and South American countries became of increasing interest. Due to this interest, studies on the educational effectiveness of pictorial material were sponsored.[1] The results of these studies suggest the conclusion that illustrations as such have no educational value if their content has not been presented in terms of the past experience of the intended audience. If illustrations are used to communicate specific ideas, they will be most effective if the number of objects and actions that must be perceived in order to understand the illustration correctly is at a minimum. All objects and actions should be depicted realistically and not open to secondary (sumbolic) interpretation. Color can add to illustrations as an attention getter, but should be used realistically (e.g., a horse should not be colored in purple) otherwise it may diminish the communication value of the picture. Captions should be used to extend the meaning of the picture rather than to explain it. This notion of simplicity and realism as the key to effective pictorial communication with people of low literacy seems to be a general principle. In studies on the comprehension of selected pictorial symbols among Egyptian farmers, it was found that difficulties in picture comprehension stemmed from an unfamiliarity of the symbols and an ambiguity in content. Bold, realistic illustrations were found to be more effective than fine, abstract illustrations.[2]

The practical implication for the designer is that the less literacy he can expect in his audience, the safer is the use of simple, realistic illustrations. It seems that the technique of photography is particularly adapted to this kind of task, as long as the complexity of the photographic composition is kept down. For instance, the number of objects shown in a frame should be kept at a minimum by the photographer. Why are simplicity and realism especially effective in communicating to people of low literacy? Another study which was conducted in rural Brazil suggests an answer to this question.[3] It was found in this study that the ability to interpret pictorial symbols is a learned skill which has much in common with the ability to interpret verbal symbols. Age and education of the people in this experiment seemed to be the main variables influencing their ability to understand pictorial symbols. Younger people (with lack of "life experience") and illiterates were clearly inferior in picture comprehension.

More in particular, the selection of detail was most important in making pictorial symbols more comprehensible for younger people of limited schooling. Both extremes, inclusion of unnecessary detail and deletion of important detail, reduce comprehension. Objects unfamiliar to the audience make a symbol more difficult to understand, while familiar objects enhance comprehension. When a process rather than an object has to be illustrated, there should be as many pictures as there are main steps in that process. "Imaginative" treatment reduces picture comprehension. Pictures are interpreted "literally" by people with limited education -- "figurative" meanings are not understood. Formal education, however, increases comprehension. The comprehension of pictorial symbols which have "symbolic" meaning demand more capacity for abstraction. Serial interpretation, or pictures not directly related to the daily experience of the viewer, are "difficult."

In the conclusions of the study, it is recommended to the designer to use bold design containing the necessary detail and to put clarity above artistic presentation. Elements which are part of the past experience of an audience can be used by the designer as cues in introducing a new object, since they enable the audience to relate the new object to experienced circumstances. Realistic rather than symbolic or abstract representations are effective. "Arbitrary" symbols (e.g., "diagrams" such as the dollar sign) depend obviously on prior learning and not all audiences are familiar with them. Over-simplification is better than abstraction with illiterate people.

As a technique for the design of pictorial material for use in populations with low literacy, it would seem a good idea to start from silhouette photographs of objects, perhaps, printed hard; and then obtain by subtraction (blanking out) of unnecessary detail, silhouette pictographs.

The results of these studies bring up

the question of what role past experience plays in the comprehension of pictorial material. Obviously, past experience with an object is needed in order to identify that object from a picture. A tribesman who has never seen an airplane will not be able to identify a picture of an airplane correctly. While pictorial material depends in this sense on past experience, it is independent from past experience in another sense.

For the design of pictorial signs used in communication with mass audiences of low literacy, it seems to follow that the designer can never fail to communicate if he follows the rule of "simplified realism." The field of application is vast. It reaches from agricultural and hygienic information, over road signs, to teaching aids for reading and writing. It would also suggest that the use of realistic components in the design of trademarks for products of vast distribution should be reconsidered carefully.

b) Persuasion of Sophisticated Audiences

The preceding experiments have shown that the "symbolic" meaning of pictures is seldom understood crossculturally or by audiences with low education. However, if the graphic designer has to persuade a sophisticated urban audience with high average education, he may use a more subtle approach than the one of "simplified realism." He is, in fact, in a similar position as a poet or the ancient expert in rhetoric whose oratory was both a tool of persuasion and a provision of aesthetic enjoyment for the audience. A complete study of the relationship between rhetoric and visual communication is still lacking.[4] There is, however, growing evidence that graphic persuasion and rhetoric have common underlying processes of verbal mediation. Some of the traditional rhetorical "tricks" apply surprisingly well in graphic communication.

If a graphic designer represents the photographic profession in a trademark for a photographer by a section through a set of lenses, he uses the classical rhetorical figure of metonymy (substitution). Examples of visual metonymy are very frequent in advertising graphics. The effectiveness of metonymic symbolism will depend on the degree of popular understanding of the relation between the substituted object and the object for which it stands.

In order to convey the idea of a chess game, the graphic designer need not represent the 2 times 16 figures of which the game is made up. It may, in fact, be more challenging for the audience to fill in the "gap" of lacking figures mentally, when the designer uses the equivalent to the rhetorical figure of synecdoche (condensation) by supplying only the picture of the castle or the queen.

Caricatures are applying the visual equivalent to the rhetorical form of hyperbole (exaggeration). The value of exaggeration in visual information and persuasion is that it brings to the attention of the audience particular features of an object or a situation. Generally these are the features which, in the communicator's judgment, are most important to get across to the audience. During the second war, exaggeration was used in an experiment on teaching aircraft recognition. It was found that distortions exaggerating the unique or characteristic features of a given type of airplane improved its correct identification.

An effective attention getter is the simultaneous presentation of seemingly unrelated material. If instead of a typical animal picture you would ifind the picture of a dog's body with an elephant's head, you would certainly look twice. In rhetoric the connection of disparate elements is called zeugma. Visual zeugma has long been used by surrealist painters and became later a well-known trick in the advertising trade.

In trademark designs we often find the combination of object forms with letter forms. This corresponds to the rhetorical device of amalgamation (fusion).

Not all rhetorical devices can be translated into a visual equivalent. For instance, the verbal metaphor "foot of the mountain" cannot be duplicated visually. While there is no visual equivalent to the verbal device of metaphor, the designer can, nevertheless, present verbal metaphors typographically and underscore them with pictorial material. The verbal metaphor "he is not able to stand on his own feet" means in our culture "he is financially dependent." This metaphor can be strengthened if the designer adds to the typographic presentation of the phrase a picture showing the feet of a baby (condensation). Such a combination of two rhetorical devices is called "crossing."

Another familiar device of rhetoric occurs frequently in life insurance advertising. For instance, we may see the picture of an attractive woman with young children accompanied by a slogan such as "think about their future." This is an attempt to persuade the husband and breadwinner to buy life insurance avoiding the mention of death. The avoidance of tabus in rhetoric is called "euphemism."

A careful study of classical rhetoric could lead to a catalogue of rhetorical devices which are capable of visual duplication. At the same time we would also obtain a catalogue of devices which cannot be duplicated visually. This would point out the limits of a new "visual rhetoric." However, further study could show to what extent the exclusively verbal rhetorical devices can still be "crossed" with the devices of the "visual rhetoric." The designer should keep in mind that the effective use of visual rhetoric is confined to one particular culture, and perhaps even to a limited audience of high literacy within that culture.

### c) Communication by conventionalized picture language

Since the industrial revolution the necessity to communicate across language barriers has constantly increased. It has been said that "we are living in a shrinking world." New means of transportation have shortened the time to travel from one language community to another, from one continent to another. International organizations such as the United Nations and peaceful international gatherings such as World's Fairs and Olympic Games give an indication of this new situation.

Linguistic attempts to make international communication easier have so far not proven very successful as the Esperanto episode seems to suggest. It seems only natural that attempts have been made to use pictorial signs instead of language. The problem then becomes that basically "non-conventional surrogates" have to be conventionalized. Conventionalization in this case means literally that representatives of various nations have to gather officially and approve a mutual agreement (convention) about the form of a pictorial sign system which becomes international law. Historically, we can observe that this conventionalization of sign systems seems to follow a certain "rhythm":

1) Some environmental problems arise, produced by technological or other developments.

2) Signs or symbols are designed, often anonymously, to communicate about these problems, at first in a tentative manner.

3) These signs or symbols are modified or corrected by collective experience.

4) The modified versions are finally conventionalized internationally.

5) Former environmental problems disappear and/or additional environmental problems arise.

6) Additional problems require amplification and diversification of the existing conventional sign code, at first again on an informal basis.

7) These amplifications of the sign code are again modified or corrected by collective experience.

8) A new amplified and diversified sign code is conventionalized.

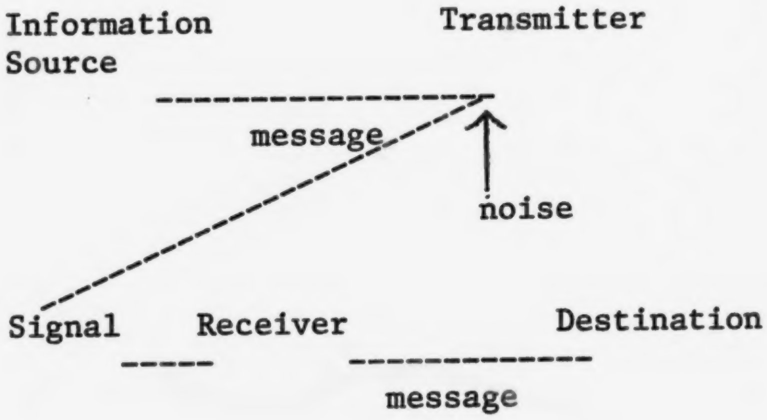
9) The same process repeats itself.

## MODELS OF THE COMMUNICATIONS PROCESS

The word model is here used almost in the same sense as the word theory. A model in this sense may take on different forms. It may be a symbolic description of a process or a formula. A formula in turn indicates to you the mathematical (or arithmentical) operations by means of which you arrive at a description of a process in the "real world." Diagrams are visual models in which essential relationships of a process or state in the "real world" are preserved. Three dimensional models represent almost realistically an object in the real world.

### I. Shannon's Model

Shannon's model is a diagram describing the communications process from the point of view of electrical engineering. Shannon defines the fundamental problem of communication as "that of reproducing at one point either exactly or approximately a message selected at another point."



Take the example of sending a telegram.

1) A source selects a message (e.g. a sequence of letters = words).

2) The transmitter transforms the message into signals (e.g. morse code = dashes and dots).

3) The channel is the medium used to transmit the signals (e.g. a pair of wires).

4) "Noise" may interfere during the transmission of the signal and distort it (e.g. static noise).

5) The receiver performs the inverse operation of the transmitter, decoding or reconstructing the message from signals.

6) The destination is the person who receives the telegraphic message and interprets it in his own terms.

The "meaning" of the message is not relevant in this system. The engineer designs the communications system before he actually knows the meaning of any of the messages which will be transmitted by it. His communications system is "neutral" in this sense.

He is only interested in how many on-off decisions his circuit can handle. One on-off switching is called "one bit of information" in the engineering language. In our daily language we talk about a "piece of information." With this we mean something different entirely.

## II. A Model of Human Communication

Aristotle formulated the first model of human communication. It was a verbal model describing the process of communicating through speech. His model had three ingredients:

1) The speaker
2) The speech
3) The audience

But this model is limited to verbal communication and we need to include other forms of human communication as well. The following (verbal) model borrows some of Shannon's terminology. It consists of:

1) Source (S)
2) Message (M)
3) Channel (C)
4) Receiver (R)

### The Source

The source may be a single person (such as a speaker or a photographer) or a group of persons (such as a newspaper staff or an advertising agency). There are four variables attached to the source which influence the outcome of the communications attempt.

1) The communication skills of the source.
2) The attitudes of the source.
3) The knowledge of the source.
4) The social system in which the source operates.

The typical communication skills of a source may be the ability to write, to draw, to take a photograph, to speak. A lack of these communication skills may seriously limit the outcome of an attempt to communicate.

Attitudes are predispositions to engage in certain actions, feelings of attraction, tendencies to avoid, prejudices, etc. Such attitudes may exist in the source with respect to the source himself (e.g. stage fright), etc. Such attitudes may improve or hinder the communication process.

The knowledge of the source about the subject-matter of communication, the audience, or other factors in the communications situation may influence the outcome of the attempt to communicate.

The social and cultural system in which the source is acting will influence communication. You may ask yourself attending to a source: Who are his friends? What is his role in society? What group does he belong to? What social or cultural background does he belong to? And your attitude may change accordingly.

### The Message

The variables attached to the message in the communication process are:

a) Code
b) Content
c) Treatment

"Code" refers to the "language" in which the message is expressed. "Language" can be understood in the narrow sense of English, German, or Spanish. It may also be understood in the broader sense of music, art, photography, etc. The choice of the language is obviously important in communication. You cannot get a message in Chinese if you do not know Chinese.

The content of the message expresses the purpose of the source. If you want to communicate successfully you have to identify the ideas which make up the content of your message. You have to test these ideas. You have to select and test the support for your ideas, and you have to arrange the ideas and their support in a suitable message.

The "treatment" of the message gives it its final "look." In your treatment you decide what should be selected for a given audience to further your purpose as a source, and how the message should be presented. For instance, having three ideas in decreasing order of importance, should you present them in a "climax" or "anticlimax"?

Code, content, and treatment contain elements and structure. A language is made up of words, a content of ideas, a treatment arranges all these elements into a final structure of the message.

### The Channel

When you transmit a message you are in a situation analogous to a person who wants to get a package across a river. You need a boat dock, a boat, the water carrying the boat, and a boat dock at the other side of the river. In communication by speech this analogy can be interpreted as follows: Your speech mechanism is like the boat dock on your side, the sound waves of speech are like the boat, the air is like the water, and the sense of hearing is like the boat dock on the other shore. In talking about a communication channel we may refer to the dock at the other shore. Our problem then would be what sensory equipment of the receiver is our target? Is it his sense of sight, hearing, touch, smell, taste, etc. We may also ask ourselves what kind of "boat" to pick. Is it speech, is it reading matter, is it radio, TV, etc. The question of the channel in communication is thus linked to the question of communication media. From experiments and practice in communication we know that in most cases it is better to use more than one channel in order to communicate efficiently. A lecture is better when accompanied by slides. TV is better than radio.

### The Receiver

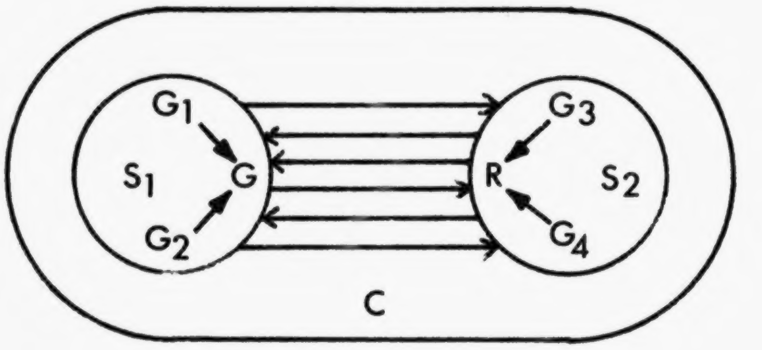
All the variables which have been said to affect the source of communication, affect also the receiver. There are the receiver's communication skills (his ability to read, to understand a diagram, etc.), there are his attitudes towards the source, subject matter, and himself; there is his knowledge about the source, the subject matter, and other factors in the communication situation; there is the social system in which he acts. All these variables affect the outcome of the source's attempt to communicate to him.

Summary of the model on human communication:

| Source | Message | Channel | Receiver |
|---|---|---|---|
| skills | code | visual | skills |
| attitudes | content | auditory | attitudes |
| knowledge | treatment | etc. | knowledge |
| social system | | | social system |

## III. A Sociological Model of Communication

If we isolate the variable "social system" from the previous model, we arrive at a sociological view of communication. Each communicator C is influenced by "primary groups" (G ), (G ), (G ), etc., such as family, community groups, etc. These groups in turn are embedded into a large social structure (S). The same holds true for the receiver (R). Various social structures are contained by an overall social system or a culture (C). Messages (arrows) may flow back and forth between all the units of this model.



To the extent that primary groups (G) for communicator and receiver overlap, or that the larger social structure is the same (S) communication is facilitated. The above model describes a situation in which the primary groups and social structure of communicator and receiver are different. Such a situation may occur when a labour leader communicates with a representative of management.

A theory of visual communication should take its point of departure from a classification of the basic types of coding involved in producing visual messages. For each type of coding, the various coding techniques should be specified. The perceptual functioning of particular subclasses of surrogates should be spelled out as to advantages and disadvantages, and the reasons for them. Finally, the resulting list of surrogates should be systematically related to all the other variables in the communication process. Conventional, non-conventional, and mixed surrogates are the major subdivisions resulting from different coding methods. Non-conventional coding includes model-building, photographic and hand graphic procedures. Conventional coding occurs in visual communication when we use typographic procedures. Mixed surrogates, partly conventional and partly non-conventional in nature, are produced by hand-graphic procedures.

Coding by setting up a conventional or non-conventional correspondence between surrogate and referent is similar to two different methods of coding in computers. In digital computers the input is coded in discrete units at regular intervals. The letters of a word, and the words of a sentence, are also regularly spaced discrete units. In analogue computers, models of real processes (e.g., the production process in a factory) are simulated by the manipulation of voltages corresponding to properties or relationships in the model. The quantities represented in an analogue computer vary continuously in parallel with variations in the real process. Digital computers, on the other hand, are essentially counting devices, where the variables, instead of being continuous, are broken down into discrete amounts.

It has been proposed to call the coding of messages by conventional surrogates "digital coding," while non-conventional coding could be called "analogical coding."

For either type of surrogate the visual transmission channel remains the only constant in the communication process. Sender-encoder and decoder-receiver variables may change. For instance, different levels of encoding skills should result in surrogates of different quality, and therefore in different reactions on the side of the decoder-receiver. Likewise, the sender's knowledge about the subject matter or about the receiver, the sender's attitude toward the message or the receiver or social and cultural factors affecting the sender, should result in different choices regarding the type of surrogate to be used. On the other hand, etc. Prayer is defined as a "magical mand." It is obvious from this description that the mand is a type of verbal behavior which is highly in favor of the speaker.

If the speaker, however, is in contact with some environmental stimulus with which the listener is not in contact, the verbal behavior of the speaker may be more in favor of the listener since it enables him to increase his contact with the environment. If the speaker says: "Water there," to a listener who is thirsty but not in contact with any water in the environment, he responds verbally to a non-verbal stimulus and his response in turn becomes reinforcing for the listener. Skinner has called this class of verbal behavior "tact" since it is indicative of contact with the environment. It is clear that "tacts" are reinforced by the verbal community at large since it is to the advantage of its members to extend their contacts with the environment.

While "mands" and "tacts" are verbal responses to non-verbal stimuli, verbal behavior is often triggered by verbal stimuli. A typical example is the answer to a question.

Very often verbal behavior in response to other verbal behavior is purely echoic; that is, the speaker simply repeats (or echoes) a verbal sound pattern of another speaker. Echoic behavior is functional in setting up verbal repertoires in children and is probably reinforced by parents at a very early age.

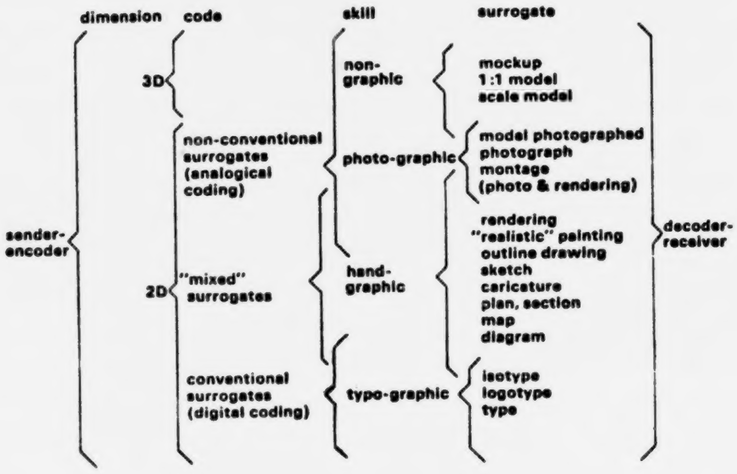
Another class of verbal behavior occurs when we respond to written verbal behavior by reading it. This textual behavior is generally subvocal in the reader. But there is some historical evidence that reading out loud was suppressed in our culture only since medieval times.

At this point it becomes very interesting for the graphic designer to reflect about the difference between typography and illustration. Skinner takes the position that there is no difference: "A text may be in form of pictures (in so far as the response consists simply of emitting an approporiate vocal form for each picture), formalized pictographs, hieroglyphs, characters, or the letters or symbols of a phonetic alphabet. An illustrated dictionary, by evoking textual responses in the presence of pictures, builds a repertoire with which pictures, or the things pictured, are later named or described." (Skinner, 1956, p. 65,67).

Obviously, textual behavior (reading) is useful in a given verbal community and is, therefore, systematically reinforced, largely by means of educational institutions. Special verbal subcommunities, such as the literary community, reinforce less functional textual behavior such as the reading of poetry.

Transcribing as in written response to a spoken dictation or in copying from another text is often reinforced by special educational institutions. Secretarial services are indispensable to our verbal community.

So far we have only examined verbal responses to verbal stimuli in which the verbal response duplicates the verbal stimulus (echoing, reading, transcribing). However, if the verbal stimulus is: "Two plus two is...," and the verbal response triggered is: "Four," we are in the presence of an asymmetrical relationship between stimulus and response. Obviously such responses are the results of verbal chains which are part of the speaker's verbal repertoire and have been sufficiently reinforced in the different levels of decoding skills may influence the outcome of the attempted communication. A receiver who is not schooled in reading a plan or a diagram will fail to understand the intended message. Likewise, the receiver's knowledge about the subject matter and the sender, his attitudes, and the social factors affecting him, will tend to improve or diminish the effect of any surrogate chosen for a given message. To repeat: The designer's job is to predict the message communicated by a given configuration to a given receiver; and with a greater knowledge of the perceptual factors involved, to create new configurations which will communicate more effectively.


dimension
code
skill
surrogate
sender-encoder
3D
2D
non-conventional surrogates (analogical coding)
"mixed" surrogates
conventional surrogates (digital coding)
non-graphic
photo-graphic
hand-graphic
typo-graphic
mockup
1:1 model
scale model
model photographed
photograph
montage
(photo & rendering)
rendering
"realistic" painting
outline drawing
sketch
caricature
plan, section
map
diagram
isotype
logotype
type
decoder-receiver

### No need for communication models

In his book "verbal Behavior" (1957) Burrhus Frederick Skinner dismisses entirely the necessity for having models of the communication process. He does not refer directly to the work of Morris and dates the "official" beginning of "semantics as a general account of verbal behavior" with the appearance of the book "The Meaning of Meaning" (Ogden, C. K. & Richards, I. A., 1923).

Since it is the task of science to predict, control, and explain natural phenomena, Skinner declares that this applies to verbal behavior as well, although it is only for reasons of convenience singled out from other behavior. The task of the behavioral scientist is then to predict, control, and explain the probability of occurrence of certain chunks of verbal behavior. This is done by demonstrating the presence of three contingencies, which according to Skinner account for any other form of behavior as well: Stimulus, response, reinforcement. When one engages in verbal behavior (i.e., speaks or writes), he responds to a stimulus. The consistency of responding to the same stimulus with the same verbal behavior is set up and maintained by reinforcement, generally dispensed by the verbal community in which the speaker finds himself.

Verbal responses may occur to two kinds of stimuli--non-verbal or verbal. When a speaker is thirsty, he responds to non-verbal stimuli, probably within his body, by saying: "Give me a glass of water." Saying this is often followed by the reinforcing circumstance that some listener responds non-verbally by giving the speaker a glass of water. To maintain the probability of reoccurrence of obtaining this response from the listener the speaker may reinforce his action by saying: "Thank you." Thus the speaker is reinforced in his verbal behavior by resulting non-verbal behavior and the non-verbal behavior is reinforced by verbal behavior in turn. (We do not have to assume obscure non-verbal stimuli within the speaker's body, but can control the probability of his asking for water by the operation of depriving him of water) Skinner has called the class of verbal behavior by which the speaker responds to a state of deprivation "mand" (in allusion to "demand" or "command"). Typical mands are requests, commands, questions, advice, permissions, offers, vocatives, past, again by the verbal community. A conversation, in this sense, is nothing else but verbal chaining behavior involving the repertoires of two speakers. Translating is another form of intraverbal behavior in which a word in one language is responded to by a word in another language.

Skinner, who also would like to dispense with linguistics (as a discipline which dissects language in artificial units such as phonemes), has been harshly criticized by linguists. Especially Noam Chomsky (1959) finds many oversimplifications in Skinner's arguments and maintains that a theory of verbal behavior is simply premature. On the other hand, Alfred S. Hayes (1964) and I. A. Richards (1965) have justly pointed to the fact that whatever imperfections Skinner's theory may show, it functions in the practice of teaching language and other subject matters by teaching machines or programmed texts.

This account of Skinner's theory of verbal behavior has hopefully shown that communication models and semantics as the discipline investigating sign-referent relationships might be dispensed with if we considered the three term contingency of stimulus-response-reinforcement sufficient in the prediction, control, and explanation of any behavior. Semantics would then just be a traditional word to be substituted by the mere operational formulation that certain verbal behaviors in response to certain non-verbal referents (stimuli) are reinforced in the verbal community.

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2. These results are quoted in a larger study of L. Fonseca and B. Kearl "Comprehension of pictorial symbols: An experiment in rural Brazil" (Bull. Dept. Agric. Journ. Univ. Wisconsin, 1960, 30, p. 2)

3. The authors of this study are L. Fonseca and B. Kearl (see footnote 2 above).

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# SEMIOTICS AS AN EMPERICAL SCIENCE

### A model of the communication situation

Cultural anthropologists, linguists, psychiatrists, psychologists, and educationalists have in recent years become increasingly interested in human communication at large. One of the discoveries made in the process was that communication does not take place via language only, but that in paralell with the linguistic channel, many other non-linguistic channels are operative during the face to face communication episode, modifying or sustaining the message transmitted by the linguistic channel. Thus, when a middle class American female is faced in a courtship situation with a male amorous proposal, she may say "no" but signalling by her rate of breathing, temperature, posture, and other non-linguistic cues a "yes." (e.g., Scheflen, 1965).

George F. Mahl and Gene Schultz (1964) have proposed a model of the communication situation that takes this split in linguistic and non-linguistic channels into account.

| Speaker's covert states and processes | Speaker's overt behavior | Listener's covert states and processes |
|---|---|---|
| a. immediate intention to communicate, allied linguistic factors | a. linguistic behavior | a. linguistic |
| b. non-linguistic states and processes | b. non-linguistic behavior | b. non-linguistic |

In this model, all connections between covert and overt behavior of the speaker and covert responses of the listener contain extra-linguistic processes (indicated by solid arrows) of which non-linguistic behaviors form only a subclass. (Linguistic processes are indicated by broken arrows.) The reason why graphic designers should be interested in this subdivision is that many of the extra-linguistic phenomena can be recorded graphically or illustrated.

### Face to face communication

The model of Mahl and Schultz is obviously confined to a dyadic face to face situation. The late Paul Deutschmann (1957) classified a wider range of different communication situations in contrasting pairs such as private-public, face to face-interposed, assembled-unassembled. It is, however, possible to generalize the model to other than face to face situations. We will not, in this context, discuss the linguistic phenomena in semiotic. But various extra-linguistic and non-linguistic phenomena can be observed in face to face communication.

1) Some extra-linguistic factors (Mahl, G.F. and Gene Schultz, 1964) Among the extra-linguistic phenomena which can be observed in communication via language are various language styles which may be measurable by verb/adjective ratio and other proportional counts of parts of speech. For instance, if a person uses more verbs than adjectives, we may infer action orientation.

   The selection and diversity of the speaker's vocabulary as measured, for example, by the ratio of different words (types) to total words (tokens), called type-token ratio (TTR), gives

gives the observer an extra-linguistic clue about the speaker.

Pronunciation, dialect, voice quality, and rhythm of speech are further extra-linguistic measures. Pausing, non-fluencies such as stuttering, frequent use of "uh" or "ah" and other speech mannerism give the trained observer additional information. Speaking rapidly or slow, in long or short utterances, with high or low verbal productivity in general are other phenomena belonging into the realm of semiotics. Many of these phenomena have been related to states of anxiety in the speaker and thus become signs in the original sense of medical symptoms. The graphic designer cannot portray these phenomena readily other than in cartoons or typograms.

2) Emotional features of language (Stankiewicz, E., 1964)
Emotional features of language must also be classified as extra-linguistic. Depending on the social or verbal context, emotionally neutral words such as "dog" may acquire emotional connotations. Coloring the sound of a word emotionally, borrowing emotionally loaded words from another language (as in "you are mesuge"), grading the intensity of sounds (as in the German military "Aaachtung") interjections, and other alterations of the sound or grammatical form of words can portray emotional states in an extra-linguistic way. Again, direct applications in graphic design are not too easy to imagine.

3) Kinesics (Birdwhistell, R.L., 1954)
Ray L. Birdwhistell developed in the early fifties in parallel to linguistics, a discipline of the communicational aspects of body motions. He called this discipline "kinesics." Kinesics deals definitely with a non-linguistic channel of communication. It maintains that no body movement is without meaning in a given context. Small units of bodily or facial movements can be readily detected and their combination into "meaningful" gestures can be analyzed. Such body movements and gestures are acquired within a socio-cultural system. It is quite obvious that group members affect each other's behavior by such gestures. In analogy to linguistics, Birdwhistell (1954) constructed a nomenclature for the smaller and larger units of the kinesic stream in communication. An example of such a unit is the "kineme" paralleling the phoneme in linguistics. The cultural aspects of kinesics have been studied by Weston LaBarre (1964) and other anthropologists. LaBarre suggests that even man's upright walk is not simply an instinctual matter. He observes that in the few known cases of children reared among animals without experience of the adult bipedal environment, the subjects get around quadrupedally very well.

That there are culturally or subculturally induced styles of walking (e.g., the "hip" gait of the jazz man) is obvious. Head movements such as nodding may mean "yes" or "no," but other bodily expressions for "yes" or "no" are present in many cultures. Gestures of greetings vary widely from culture to culture. Kissing is present in the Germanic, Graeco-Roman, and Semitic cultures, but is by no means always a sign of erotic communication. Kissing between men and women may be entirely unknown in tribes where women wear lip plugs for decoration. Sticking out the tongue may be a gesture of surprise, negation, or mockery depending on the culture in which it occurs. There are many gestures of contempt, obscenity, or beckoning even the naive tourist runs into as he travels from country to country.

Gestures of politesse and ceremony are richly and differently elaborated in various cultures, as is the psychology of clothing and nudity.

Conventionalized motor acts and conversational gestures can be observed in silent movies as well as in any place where people gather together.

Gestures may often be a clue to the ethnic background of people (e.g., the Italian is sometimes easily identified by his gesturing).

Many motor habits in using tools or carrying out work may be different from culture to culture. Thus, in Indian needlework the needle is pulled away and not drawn to the operator. A study of such cultural differences could have very practical implications for industrial design and the manufacturing of tools. Not only gestures but sounds in music, whistling, and drum languages are differently stylized from culture to culture.

Kinesics, and especially cultural kinesics, has very important implications for graphic communications. Sometimes we "freeze" gestures in graphic symbols. An example is the pointed finger as a directional sign. The potential of using "frozen gestures" in crosscultural symbolic communication is at once an untapped promising potential and a possible source of confusion, since most gestures are known only in limited cultural groups.

4) Proxemics (Hall, E. T., 1959, 1963, 1966)
Non-linguistic communication is not limited to kinesics. Touch, bodily odor, and taste are also used as non-linguistic channels of communication. Martin Krampen (1959, a,b) proposed an extension of the linguistic terminology beyond kinesics. For example, the terms "tocsin" in "haptics," "ozon" in "ozonics," and "edon" in "edonics" were proposed in parallelism to the linguistic phonem as building blocks of non-linguistic face to face communication. Edward T. Hall (1963) elaborated in his proxemic notation system a complete and practical tool for the description of human interaction in terms of posture, body orientation, kinesthetics, touch, smell, and voice loudness.

Communication by pictures, sculptures, and architecture
There is no particular reason why non-linguistic communication should remain confined to the face to face situation. This limitation would appear to be analogous to ruling out written sources in linguistics. Paul Deutschmann (1957) would classify communication by writing as an "interposed" situation. When the "interposed" situation assumes "public" (as opposed to "private") character, we encounter communications situations which are typical in pictorial,

sculptural, and architectural messages. They are traces of human behavior just as those recorded by anthropologists in scratchings on surfaces or piles of stones.

Pictures, sculptures, monuments, and buildings are often found in our environment as "to-whom-it-may-concern" messages, to use an expression of Norbert Wiener (1954, p. 71). Again, in analogy to the phonem in linguistics, Martin Krampen (1959 a, b) proposed the expressions "glyph,"[1] "graphem," "plasm," and "technem" as basic units of analysis for written, pictorial, sculptural, and architectural communications. The change in the "meaning" of compound technems which might be called technomorphs (Krampen, M. 1959 a, b) such as the column or the gabled portico has been diachronically studied by Wittkower (1955). The gabled portico, originally a structural unit (a way of supporting the roof of the house), became the entrance to the sanctuary in Greek and Roman architecture. In Palladio's architecture, the eminence of the individual rediscovered in the Renaissance was signalled by making the gabled portico into the entrance to a "private villa." In the era of liberalism when art and learning became the holy right of every individual, it became a typical feature of museums, universities, and libraries. With industrialization and the emergence of capitalism, it finally was built into banks and railroad stations. In "colonial" architecture and its present day suburbian copy, the structural origin of the gabled portico is totally extinguished. It has become a wooden counterfeit of his Greek ancestor, used to show off the "prestige" of the middle class owner.

Recently, Randall Harrison (1964) changed the basic unit "graphem" into "pict" and developed a discipline of "pictic analysis." The basic element of pictic analysis is a "pict" (paralleling the phoneme). Examples of picts are dots and lines which can appear in a certain contrast, position, and duration of exposure on a surface. Picts can be combined into "picto-forms." Example of pictoforms are circles, rectangles, triangles, etc., which again can vary in contrast, position, and duration. A combination of picts (or pictoforms) can bring about a denotative meaning response in the perceiver (e.g., a circular pictoform including two dot picts above a horizontal line pict may be labeled "a face"). Such a combination is called a "pictomorph." Pictomorphs (in parallel to morphems in linguistics) are capable of representing a non-present object. A circle including two dots above a horizontal line is called a "free pictomorphic form" because it is without additional cues identified as a "face" by most observers. In contrast, it is only within the context of the circular pictoform that the two dot picts are identified as "eyes" and the line pict as "mouth." They are, therefore, called under these circumstances "bound pictomorphic forms."

Pictomorphs combine on the next higher level into "pictophrases" composed of free pictomorphs. For instance, the pictogram (or silhouette) of a walking man, as found on a European traffic sign, is a pictophrase. On the next higher level, pictophrases are combined into "pictures." One could thus combine several pictograms (or silhouettes), as found on traffic signs, into a picture. "Picture layouts" combine pictures in a spatial context (as, for instance, on a magazine page) and "picture sequences" combine pictures in a temporal context (as, for instance, in a movie). A "scene" consists of a picture sequence limited to a single location. An "act" is built up out of several scenes. One or more acts form a "production." Several productions may be linked together into a "series" by certain common features in content and format.

In one experiment, two dot picts above an arch pict (turned downward) were held in a constant position within a circular pictoform. Above the two dot picts an angular pict was shown. To some persons participating in the experiment, the angle was shown pointing downward, to others pointing up. In the first case, the resulting face pictomorph was described by the viewers more often as angry and aggressive; in the second case, more often as sad, unhappy, and worried but more kind and uncertain than the first.[2] This change in the descriptions of the people in the experiment is reliably due only to a slight variation in the position of the eyebrow pictomorph. Results of this kind had, of course, been previously found in many studies on facial expressions (physiognomy) beginning with Darwin. For instance, "beauty" seems to be related to medium or high forehead, with eyes and mouth in mid-positions, while "ugliness" seems to be related to low foreheads, long faces, low mouth, etc. Caricaturists have informally applied this knowledge in their work all along, "sharpening" or levelling" certain of these distinctive features.

For the time being, pictic analysis has been only applied to discover something like a vocabulary and a grammar for the pictorial code of facial expressions. The consequence of this could be that a computer might be programmed to "draw" a happy or a sad face according to instruction. Since pictic analysis is, however, still at its very beginnings, the consequences of this approach for a better understanding of graphic communications are difficult to estimate.

## The cultural determination of communication

Semiotics, the study of "patterned" communication in all "modalities" as Margaret Mead has defined it (Sebeok, T. A.; Hayes, A. S.; and Mary Catherine Bateson, 1964, p. 5) is an interdisciplinary effort to understand the use of signs, symbols, and other units in human communication behavior as it is differently acquired in various cultures.

As a mnemonic device for all the factors entering interpersonal communications, Alfred S. Hayes (1964) has suggested the term ISC (interactional Syndromes in Context). What happens, in fact, in human interaction is that a sequence of different signals in different signals in different modalities (linguistic and extra-linguistic) are exchanged in complex bundles or syndromes. This exchange always takes place in a cultural and situational context. As people learn to appreciate ISC's and understand the differences of their communication habits, one hopes that they will eventually be able to communicate better across cultural, ethnical, and political gaps.

## The human-factors model of man-machine relationship

During World War II, the development of computers was speeded up for defense reasons. For instance, it became necessary to predict from radar data the altitude and anticipated position of an airplane flying at a certain speed, and to calculate the ballistic curve of the anti-aircraft projectile in such a way that the predicted position of the airplane and the explosion point of the projectile coincided. This meant a number of complex calculations which could be handled best by computer. In practice, the gun had to be pointed towards a position where the aircraft had not yet arrived. The important link in the system of sensing the airplane by radar, calculating its future position, integrating this calculation with the ballistic curve, and pointing the gun in the right direction were radar operators and gunners who had a task which amounted to tracking the present and future position of the airplane on the basis of instrument readings. Hence, it is not surprising that the key position of these operators in the radar-computer-gun system became of interest to researchers. The "human error" which could easily be introduced into the otherwise perfectly mechanical system was costly and sometimes deadly, and had to be reduced. "Human factors engineering" and computers have, therefore, to a certain degree developed in parallel.

Man, in these so-called "man-machine systems" was primarily an instrument reader and crank or knob turner. Since perception in such a situation seems to be reduced to a direct visual contact with dials and action to the pressing of buttons, sometimes the legibility of dials and the shape of buttons, knobs, and handles became of great importance. Of course, it was realized that man was in himself a "feed-back system" and that he was, therefore, better placed into some positions of the system than into others. However, the typical diagram of the man-machine system was composed of: (Figure 1)

1) The machine, exhibition displays and controls, accepting inputs and producing outputs,
2) man, facing the displays with his receptors (e.g., eyes, rstd), which send messages into his central nervous system, which in turn sends messages to his effectors (e.g., hands, feet, contacting the controls of the machine.

The displays were said to produce stimuli to which the operator responded (Birmingham, H. P. and Taylor, F. V., 1954). There are similar but more sophisticated versions of this basic diagram incorporating the concept of feedback to a high degree (Thomas, E. L., 1965). However, it seems that all man-machine systems diagrams of the traditional human factors origin can be reduced to stimulus-response theory. (Figure 2)

### Perception and action

While S-R theory has produced useful results in human factors engineering as well as in psychological theorizing in general, it leaves certain deeper questions open. These questions seem to belong more into the realm of philosophical theories about how man acquires knowledge. However, depending on the answer to these questions, new horizons may open up or remain closed. A typical question which may be asked is as follows: Given an object such as a machine, a medium such as light waves, a receptor such as the retina of the eye, where or what is the stimulus in this context?

In his 1926 paper, "Thing and Medium," Fritz Heider (1959) grappled with this question and came to the conclusion that objects or "centers of the causal texture of the world" are molding the medium (e.g., light waves) in such a way that it agrees with man's makeup to perceive these objects on the "thing" level (i.e., on a level), which is important for his functioning and survival.

One could, for instance, imagine a different coordination between object, medium, and perception by which the perceptual result would be on the molecular level rather than on the "thing" level. The perceiver would see random motions of molecules of different densities rather than a machine, a chair, or a table.

Perception, according to this "functionalist" view, is thus a process connecting two focal points: The object of perception and the resulting percept. One focal point, the resulting percept, is a functional interpretation of the medium which in turn is molded by the other focal point, the object.

An example of functional interpretation is the fact that the perceiver continues to interpret a large object as large, even if it is far away and, therefore, the light rays reflected by it affect a much smaller portion of the retina as if it was close. Technically this perceptual fact has been called "size constancy." It is functional for man's survival, orientation, and correct interpretation of the environment if the varying medium-offshoots from the object can be interpreted as belonging to a constant "thing," whether it be close or far, badly or well lit, or viewed from different angles (Heider, 1958, p. 22-29).

There are some examples in perception which exhibit a straightforward coordination between thing, medium, and perception. Gibson (1950) has shown that distance perception depends to a large extent on the coordination between object texture and the sheaf of light rays reflected from all points of the texture in such a way that a texture gradient of stimulation results on the retina, corresponding to the perception of coarseness in the foreground, tapering off into fineness in the background.

The perception of object edges and outlines in pictures seems to follow similar laws of coordination: Sharp breaks in luninosity indicate the end of a surface (Hochberg, J., 1962). If one were to construct a robot capable of sensing edges in the environment, one would have simply to reconstruct the pattern of three types of nerve cells situated behind the retina which react to the light exposed area of the retina in a particular statistical mix of discharges, some cells firing on light on, some on light off, some in short bursts on light on and off (Bartley, S. H., 1958; Baumgartner, G.; Hakas, P., 1959).

On the other hand, the two focal points of the perceptual arc may not always be that well coordinated as in the case of texture gradients or simultaneous contrast. When no simple coordination sustains the functional interpretation of the environment, one has to assume that the correct interpretation which in most cases is nevertheless accomplished, results from other mechanisms in the perceiver. These mechanisms have differently been called "meanings" or "evaluations" or "concepts," etc. Such words refer to a hierarchy of schemata which allows that perceptual end result to arise that fits best the medium-offshoots from the environment and at the same time the system of schemata itself (Heider, 1958, p. 58). It is obvious that these mechanisms are not perception in the sense of direct awareness, but include judgment and cognition. Hence, the strict differentiation between perception and cognition is not very fruitful if one wants to understand the different ways man has at his disposition to know about his environment and to adapt successfully to it.

The concept of the percept as one focal point of the perceptual arc between "thing" and man suggests a first correction of the human factors diagram. The pointer on the dial read by the operator is really not the "thing" or object of perception (Heider, 1959, 110). If the operator uses a dial to pinpoint the position of an airplane or to measure any other properties of the environment (including the behavior of the machine of which the dial may be a part), the pointer is an extension of the observer. Only if the operator is calibrating the measuring instrument itself, the pointer becomes object of observation. Dials in observation and measurement mediate, but are not the focal point of perception.

In parallel to perception, action can be considered as an arc based on two focal points. One focal point is the center from which the action emanates, the other focal point is the location where the essential part of the action occurs, generally within the environment. The organs of our body, our hands, our feet, serve to mediate action. Tools, machines, animals, people, can transmit as media the impulse originating in the acting person to the terminal focus of action. As we perceive things through the medium of light waves, so we act on things through bodily organs and tools (Heider, 1959, p. 32). The focal points of action, especially its origin, are more important than the type of mediation through which the action is propagated. For the anti-aircraft gunner the turning of the crank as an immediate effect of his hand movements is meaningless. It serves only as mediation between the focal points of action - the terminal being the explosion of the shell in the predicted position of the enemy aircraft.

## Psychological field theory

To summarize the criticism of the traditional human factors approach, one could say that the old approach was only concerned with the peripheral input and output of the human operator, whereas it is now proposed to focus attention on the central perceptual result and the central determinants of action. This new approach would suggest a man-machine relationship model which is based on psychological field theory rather than on S-R theory.

Field theory derives its name from the new ideas which such great physicists as Hertz, Maxwell, and Faraday introduced during the latter part of the last century (Deutsch, M., 1954, p. 181, 182). The psychological analogy to physical field theory was proposed and elaborated mainly by Kurt Lewin (Cartwright, D., 1951). It amounts to viewing any psychological event as occurring in a psychological field that is part of a dynamic totality of interacting psychological forces. The subject under study is considered as the person p in his own field perceiving or acting with respect to object x or person o. If we assume x to be a machine and o another person, a new diagram of man-machine relations can be adapted from Lewin's field theory (Figure 3). It is important to understand clearly that the "field" under discussion does not symbolize any geographic description of environmental circumstances. The diagram is simply an attempt to describe the psychological situation in which p finds himself with respect to x and o. The field is p's own psychological world.

Lewin's field theory has been criticized on various accounts. The analogy between physical and psychological field is of course, dangerous since it combines two extremely heterogeneous subject matters. On the other hand, the adaptation of the field concept to physics could not have occurred if the term had not been in previous use suggesting such an adaptation. If the psychological analogy is taken simply as a heuristic device which is fruitful in discovering and describing psychological phenomena, there can be no objection to its use as long as these discoveries are subjected to experimental verification.

Another criticism applies to the content of the field itself - psychological data such as perceptions, thoughts, feelings, and attitudes which are difficult to obtain. Probably depth interview data come closest to being representative of a person's psychological field. The phenomenological method has been advocated (MacLeod, R. B., 1947). This method is an attempt to describe the essential characteristics of the phenomena as they appear to the observer who tries to keep free from bias and to maintain a disciplined naivete.

These methodological difficulties bring about the question of the scientific status of psychology as such. Many psychologists would agree that psychology is not yet a highly formalized science (Heider, F., 1958) and that a good dose of intuition is necessary to accumulate pretheoretical hunches and ideas which are the stuff from which a more formalized theoretical system can be built.

The orthodox S-R psychologist tends to nourish the hope that a complex machine model will eventually fit human behavior. He tends to feel that this would make him more acceptable to the physical scientist. In psychological terms, this type of psychologist reveals the traits of an "authoritarian personality" in that his emotional security as a scientist derives from dependence on an authority figure, the physical scientist whom he imitates in executing "precise" experiments and pressing for a "rigorous" methodology (Criswell, J. H., 1958, p. 96).

On the other hand, it may not even be good strategy at this stage to aspire at highly formalized theories in psychology (Rudner, R. S., 1966, p. 11).

Since the psychologist depends most of the time on the report of people about their own experience in order to gain insight into the processes occurring in their psychological fields, it would appear that much can be learned by analyzing the structure of commonsense psychology which people abide by in their daily living and which is reflected in many expressions of everyday language. Heider (1958) has proposed to detect the concepts underlying the psychological notions of everyday language by using a notation similar to that of symbolic logic.

The content of the "field" under observation is symbolized by p (the subject of observation); o and q (other persons); r (an undetermined person); and x, y, z impersonal entities, things, situations. Perceptions, actions, and attitudes can be expressed as relational propositions by means of capital letters. Thus pRx means that some relation holds between p and x. A colon is used to relate two or more relational propositions. If C stands for the relation of causation, then the expression rC:pRx means that "somebody causes p to be in relationship with x"(which might often be the situation in which an operator finds himself with respect to a programmed display).

## Naive analysis of interpersonal perception and action

Since the content of the psychological field is always made up of people and objects, never of objects alone, the division between general and social psychology becomes, to a certain extent, meaningless. Psychology is always social psychology since the psychological field of man is never free from past, present, and anticipated relationships with people (Krech, D. and Cruchfield, 1948, 8).

What is the difference between people and objects? People are generally seen as centers of action or causes of change in the field. In order to obtain causal stability in his psychological world, man has to connect events with sources producing these events. If the source of an event is thus identified, it is generally endowed with an intention to produce the event; or one says that the source was forced into doing something it did not intend to do. Man also stabilizes his world by asking "why" a source may have intended to cause an event. The naive answer is that it wanted to do it for its own pleasure or that it identified with more general ethical principles according to which one "ought" to act in a certain way and not in another. In short, man attains the relatively invariant aspects of personal relationships by attributing changes in the field to the action of people whose intentions can be inferred from or explained by their own intentions or other forces in the environment. Intentions are either inferred or read off from bodily or facial cues (Bruner, J. S.; Taguri, R., 1954). Man just seems unable to function in a situation like the Queen's Croquet Ground in Alice's Adventures in Wonderland (Gardner, M., 1965, 111-117).

What is a person?
Whether man sees only people as sources of environmental changes is another question. To the child and to people in other cultures, animals or things appear often responsible for changes in the field (Heider, 1958, p. 57). Solomon Asch (1958) points out that people and things are similar in many respects: In daily language we use the same term to describe physical as well as psychological qualities. A man can be said to be "hard," as a table can be said to be "hard." While both are totally different, the interaction with both can contain similar experiences, such as running with one's own action into a blocking obstacle which requires a great deal of force to be removed.

A. Irving Hallowell (1958) reports that in the thinking of the Ojibwa Indians, the category of persons does not overlap with the category of people: These Indians conceive of person-objects, although not in a dogmatic, animistic way. In Ojibwa language, nouns fall into two classes distinguished by different plural suffixes. These classes refer to objects which correspond approximately to our Western "animate" and "inanimate" dichotomy. Stones, for example, belong into the class of "animate" nouns. Hallowell once asked an old Ojibwa: "Are all the stones we see about us here alive?" The old man reflected for a long while and answered: "No! But some are." (Hallowell, 1958, p. 65).

There is evidence that personification of objects is not limited to a few primitive cultures, but that it may be universal. Everything which is mobile, capricious, unpredictable, responsive, origin of actions, locus of intrinsic power can assume a highly significant, threatening, or rewarding character in the psychological field whether it be human, animal, or object. It is to this class of source phenomena that man tends to attach person characteristics. If somebody asked the question: "Are all machines we see about us persons?" A wise answer would probably be: "No! But some are."

How different are man and machine? Stressing the similarities between man and machine, Norbert Wiener argues in his "God and Golem, Inc.," (1964) that the basic human capabilities----learning and self-reproduction----can be duplicated in sophisticated equipment.

There are enough examples in everyday life which indicate that people interact with machines in a quasi-human fashion. Machines are talked to, are listened to, are caressed, or kicked. In his analysis of revenge as a typical event in interpersonal relations, Fritz Heider (1958, p. 271) writes:

> "If the target [of emotional expression] is an object, one can also assume a physiognomic perception in which things are endowed with a tendency toward self-preservation and self-activation. One can act for a thing by taking care of it, cleaning it, keeping it in good shape, and repairing it; or one can act against a thing by destroying it, breaking it, or making it dirty.... Each thing tends to be as good and as perfect as possible, and the meaning of breaking a thing is acting against this tendency....a hard, resistant object is more suitable for the expression of counteraggression than is a soft, yielding object. This is so because the resistance of the object represents itss opposition to p's attack against its intrinsic tendencies ... Pounding one's fist on the table is a representation or image, as it were, of what the person has just experienced, namely an action obstructed by an obstacle."

On a broad popular level, the present-day Laddites, most vociferous among the representatives of Arts and Humanities, built their speculations around the popular fear that "the machine will take over." This expression reveals clearly that machines altogether are endowed with the intention of invading our life and, especially, taking over our jobs.

## Applications of interpersonal psychology in Research and Design

From the proposed line of arguments, it results that the engineer of man-machine systems can learn a great deal from the psychology of interpersonal relations. A whole new program of research and applications could be derived if the available knowledge about human interactions were examined and those observations were sifted out, which seem to be promising hypotheses on the more general level of man-object relations. The goal of creating a relationship of "conversational" character between a designer and a device accepting visual input and producing visual output is already reached. It would be interesting to study the implications of this situation for the designer and to work on the perfection of the "conversational mode." In her studies of sociable interaction, Jeanne Watson (1958) isolated three particular types of face-to-face communication between humans. They are defined as work-oriented, familial, and sociable interactions. It would seem that the description of work-oriented communication should apply to man-machine conversation as well. Work-oriented conversation focuses on the job to be done; familial interaction revolves around routine events and problems of everyday life; sociable talk is concerned with the more specialized, non-routine concerns of the participating individual.

The style of the conversational mode between man and machine should, therefore, emphasize expressions referring to the making of progress in the task at hand, to the completion of subtasks, and to moving on to the next job. It should include expressions of reinforcement for productive and competent performance of the operator.

## FOOTNOTES

1. Recently a group of social scientists in the U.S.A. interested in pictographic communication formed a group called "Glyphs, Inc." Among the members are Margaret Mead, Harold D. Lasswell, Rudolf Modley, and Lawrence K. Frank.

2. This experiment was carried out by M. MacLean, Jr. and R. Harrison at the Institute of Design, I.I.T. in Chicago. It was published in mimeographed form by the College of Communication Arts, Michigan State University, 1961. Since then R. Harrison has conducted further systematic experiments in this area.

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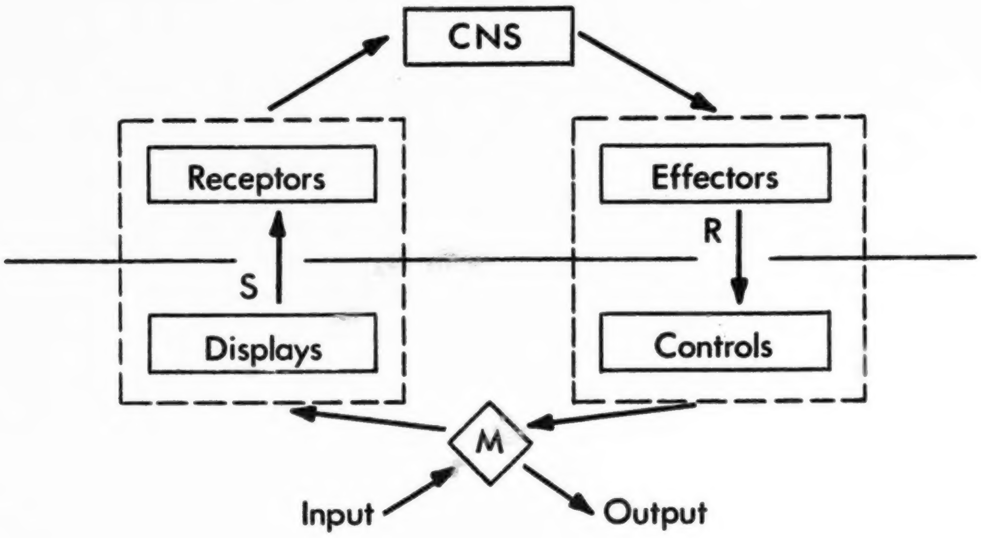

CNS
Receptors
Effectors
S
R
Displays
Controls
M
Input
Output

Fig. 1

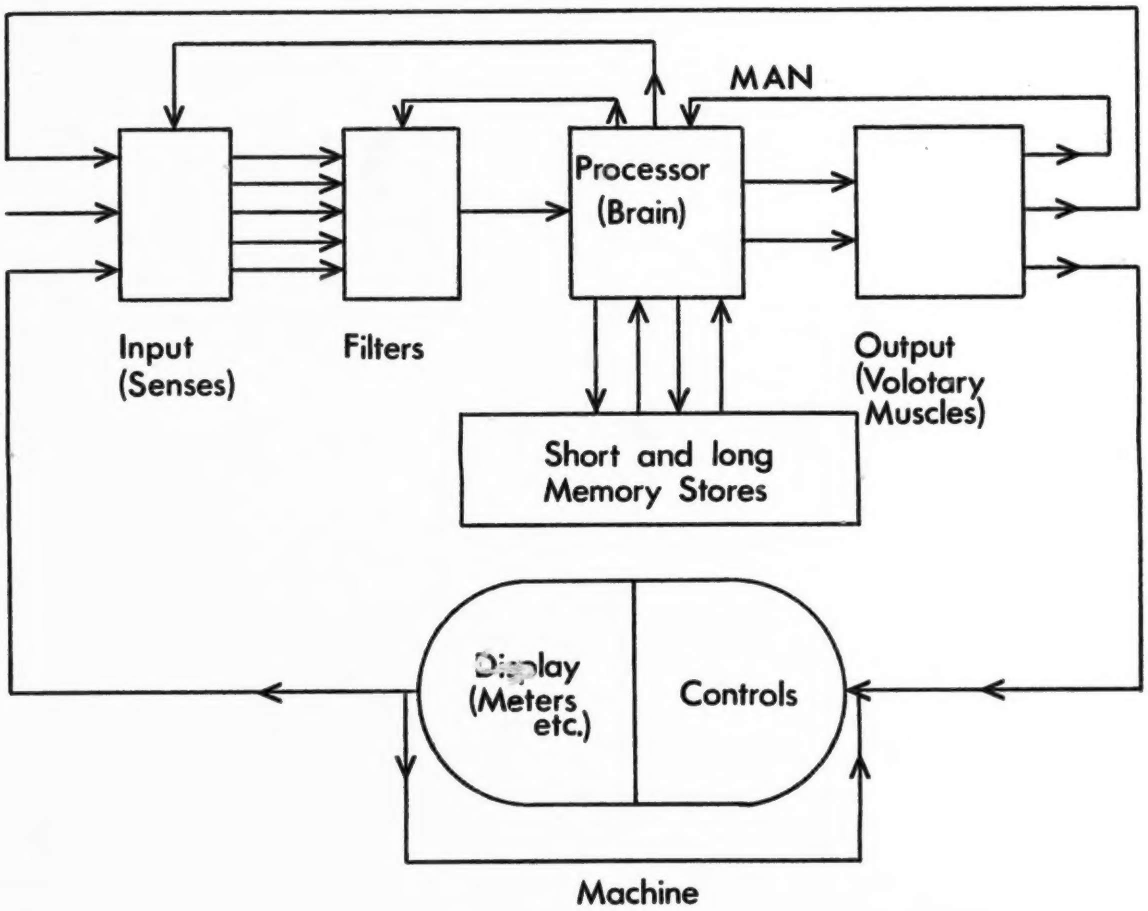

MAN
Processor
(Brain)
Input
(Senses)
Filters
Output
(Volotary
Muscles)
Short and long
Memory Stores
Display
(Meters
etc.)
Controls
Machine

Fig. 2

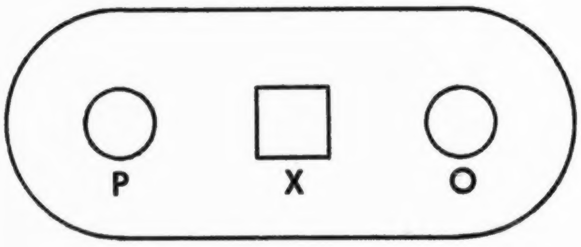
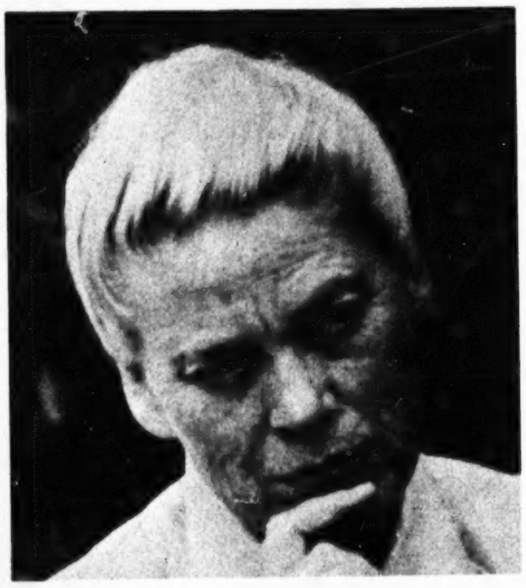


Fig. 3

# CONVERSATIONS ON COMMUNICATION

## by JUDITH MILLER



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### LECTURE 1

It says here that I am going to talk about the use of generalizations as vehicles for discovering, analyzing, codifying, storing, retrieving and using information. When I wrote that I thought it sounded very good. Now I really have no idea what it means, and the trouble with meanings is that what I send and what you receive may not be the same and further what you or others interpret the meaning to be could be something else again. A good many years ago when we first moved to the country, we had a very handsome dog who objected to the man who read the light meter. So one day we had to go away on business and we left our son, who was in the fourth grade, in charge saying, "The dog doesn't like the light-meter man, so we have to leave you with him." Well, he interpreted that as meaning, "If I go away and take the dog, nothing will go wrong." The message that we sent and the message that he received were not quite the same. An hour or so later we came back to find a marvelous trail of blood all the way down the hall. We followed the trail of blood (this does not have an unhappy ending) into the bathroom. Now this boy had been told that if you put the clothes to soak in cold water after you have nearly bled to death, the stains will not be permanent. He and the dog had gone down to investigate the smoke at the foot of the hill. It turned out that the smoke came from the burning trash at the dump. Well, the dog leapt across the canyon, so the boy got the message and attempted to leap across the canyon, too, and landed in the glass at the bottom--cutting, of all things, only his finger. Well, we got many messages and had all kinds of attacks and miseries. Ultimately, the entire episode reduced to a cut finger which he had splinted himself. Many messages, many interpretations are involved in this unimportant tale.

I teach a class at the University of California at Los Angeles in the Extension Division. I love to tell how I got the job, because I think so many things are accidental in this world. If you pick up the message when it is there, what seems like an accident may really have an overtone, at least, of recognition of opportunity. I once was on a program with some school administrators. We were talking about what supervision was and they asked me what I thought supervision was. Of course, I object to it. I can't recall ever doing anything more or better because someone was supervising me. The message the supervisor intends isn't necessarily the one I get. I believe he is intending to help me, probably, but I believe he intends to put me down, actually. So we discussed what supervision was and after the program was over a man on the panel said to me, "Would you like to come to work at the University?" I said, "Well, I don't think you would pay enough." He said, "Well, we will talk about it some other time." Some years later I saw him again and he said, "We have upped the ante," and I said, "Well, at present I am tired of the job I have so I'll consider it, if I can write up my own course." He said, "Well, write the course and send it to me." (He was dubious by this time.) So the course was "How to do More Work Easier With Results That Last Longer and Give Greater Satisfaction in the Long Run." It was to be for elementary teachers and was concerned with the collection, preservation, collation, file, retrieval, and use of the kind of supportive materials that an elementary teacher is stuck with handling. Usually what she has isn't lost, she just doesn't know where it is. It is in what is known as the "flat file." I understand the flat file very well, because I have a very beautiful Japanese brush-drawing of a fish. I know I have it because I can find it when I am not looking for it. I have never yet found it when I was looking for it. So my course, of course, is to do as I say, not as I do. At any rate, I finally got my course all described and felt very good about it. One of the key words in the course summary was "bottleneck." So my friend, Dr. Robert Haas of UCLA, said, "I will have to take this statement to the Academic Senate." I said, "You never told me about the Academic Senate." "Well," he said, "we don't start any of the courses unless the Academic Senate has its say." I didn't think a thing like a senate could have "a say." At any rate it turned out that the Academic Senate didn't like the word "bottleneck." It isn't an academic word! The fact is that it may not be an academic word, but it is an academic problem. So I said I can't bow on bottleneck, that is the problem and that is the word.

In trying to teach the course, I found out several truths. One is something I am sure you know--at least you know it about two o'clock in the morning if you are sleepless, and it is that you really cannot teach. Along with that is the corollary that says that you don't know as much about teaching as you believe you do. The third truth is that your greatest resource is your student. I have saved my initial course description and summary; periodically I read it; it looks marvelous, but what goes on in my course has nothing to do with what was in that original course description. Almost everything that happens in the course is a kind of quiet subversive infiltration on the part of the teachers who are in this class. If such a thing is true of teachers, then I think that it could be very much more true of younger people because they are more daring. I will give you one example. One summer a woman in the class brought me a little book and said, "I think this would be a great idea for a bulletin board. I think this book which is so succinct and---," I am using my language, she didn't say that at all. She said, "I think you ought to look at this. It would make a great bulletin board." I said, "Well, I will." I put it in my car, and every day I would come back to the class fresh with all the things I was going to tell them. Naturally, I

I didn't listen to anything they had to tell me. Finally, the last day, because I didn't want to be rude, I looked at the book. Of course, I had denied the entire class a really brilliant idea and if I have learned anything, it is not to deny the student.

Later this morning I hope to show you a set of slides of the work of Alvin Lustig. I can't believe everyone doesn't know who he is, but this again is an assumption so I am going to say (and if I insult you, I don't mean to) that Alvin Lustig was a Los Angeles City College student who worked under Dick Hoffman. He left City College and went to study under Frank Lloyd Wright. Some place along the line I think he went briefly to Puerto Rico or some such place on a government thing. I would hate to be quoted as literally knowing what Alvin Lustig's youth was like, but from the outside and from this distance he seems unsettled. In the thirties, he was back in Los Angeles where he found a triangle of property near Wilshire, Westwood and Sunset Boulevards--beautiful property in much the way that Washington is beautiful and this is uncommon in Los Angeles. He had a little building there and started a printing service, really a graphics service, except that he was both designer and producer. Well, of course, you know what happened to Lustig, he became a very well-known man in the field, ultimately working in architecture and related fields. He died some years ago while he was, I believe, still in his thirties.

Now, there was a young librarian at the Clark Library in Los Angeles. (If you haven't been in the Clark Library, when you are in Los Angeles, go! It's near Adams and Cimarron and belongs to the University of California.) The librarian, whose name was Powell and who is now the librarian for UCLA, was interested in what he called "fleeting graphics." I think he was like the man who collected the Thomason papers. In case you are not a student of English literary history, Thomason felt that anything that wasn't copyrighted might be more significant than something that was, because uncopyrighted things tend to be exclusive or of the moment or politically significant. So every morning this Thomason (17th Century) went around and pulled down all the broadsides of any political import. He did something else which I like--he made notes on who printed or wrote them. They may not have been copyrighted or identified, but he recognized that so-and-so had a crooked "S" in his typeface. Or such-and-such had a certain kind of Yorkshire manner of writing and thus made identifications on the basis of internal evidence. The Thomason Papers, I think, are one of the great collections of fleeting materials. Of course, the man who made this collection never got paid. He made the collection; he took it out of London and hid it in the castle, (you know, a Dumont story--); and finally the English Government bought it from him. There is no record that he was ever paid, however. If you wish to do a study on that kind of thing, Anna Ella Carroll, who wrote the papers that kept Maryland in the Union and who was responsible for figuring out a way to get to Vicksburg by the back route, was never paid by the United States Government. These things are probably not significant here, but to me they are like a beehive; they hum together.

Anyway, back to Lustig. So Lustig's fleeting materials which were collected spasmodically by art teachers or whoever, a very astute librarian collected and kept in the files of the Clark. When I knew I was going to come up here, I felt I had to have some kind of ace in the hole--something that no one else would have. I called up the Clark and asked if they still had the Lustig collection. They not only do have it, but Lustig's widow had supplemented the collection with other items. Along about 9 or 11 o'clock, we will look at them. The thing about Lustig which intrigues me is that this man apparently hatched out full grown--I believe he was influenced by the people who came in contact with him, but I don't believe they taught him. And I can recall in about 1936 he was asked to give a talk to the art teachers in Southern California. The art supervisor was a brilliant woman who said something which I will pass on to you. She had an exhibit of very handsome flower prints on the wall in the room in which Lustig was to speak. Someone said to her, "Aren't those beautiful! I understand that Miss Cogswell paid only $1.50 a piece for them and you couldn't touch them today for under $200 a piece." I am making up the amounts. "Isn't it wonderful that Miss Cogswell got them so cheaply." Miss Smith said, "She didn't buy them cheaply, she paid for them with judgment." So Mr. Lustig, who was then a youngster--but I have come to believe the wisest old men in society are the bearded youngsters--came to talk to all of us art teachers. At that moment, this in-his-twenties-boy was reading Sir Herbert Read, who was then not Sir Herbert Read, but just Herbert Read. It was way beyond most of our depths, but we were trying to listen. (I think it was an institute credit.) Pretty soon it got very quiet and the woman sitting next to me raised her hand, and asked, "Does this have anything to do with Yogi?" Lustig waited a long time and then he said, "No." I really do have a point here. It is, once more, that the message sent may not even be the one you are sending, you know. And the ones received may not be the ones you sent. And the one that is interpreted out of it--or whatever word you want--may be some other message. This is an old story, but I still believe an important one.

And to go with this problem is the fact that we believe we teach and we like to take credit for the endowment of our students. This is one of the reasons when we are young we prefer to teach the very bright because doing so makes it seem as though we can teach. After you are older and you are not so sure you can teach, it doesn't matter.

I am going to tell you a story about a generalization hoping that this will explain what I am talking about. A good many years ago, I went to Aspen when Anatol Rapoport was there. Dr. Rapoport was talking about the fact that technology has advanced more rapidly than the language (that is the spoken language) we use to discuss technology--he meant also science, not only technology--so that we can't talk about what we are looking at or thinking about because our language is a kind of horse and buggy language. He felt also that people separate concepts and facts. I brought his lecture with me from that year and, if there is someone who is interested in what Dr. Rapoport had to say then, I have it for you. At any rate, in the course of his lecture he said, "A cow is more like a buffalo than it is like a horse, but it is more like a horse than it is like a cat. And more like a cat than a lizard; and more like a lizard than it is like a lobster. But as different as a cow and a lobster are, a cow is more like a lobster than it is like a geranium." Well, everyone in the Aspen tent thought that was pretty funny and I went home and thought about it for a long time and decided it would make a great child's book--one that would start not with fact, but with relationship; not with information, but with concept; and use information to support the concept and reinforce relationships. I wrote to Dr. Rapoport and asked if I could use his sentence as the basis for a child's book. He wrote back in longhand because, of course, it is quicker and more efficient than getting to your secretary and the office, and the typing pool, and the triplicates and all of this. So I have this darling little note from a very great scientist in which he said, "Fine, it is yours."

So I started to write. Almost immediately, I discovered that the problem of buffalo isn't so simple as you might think because what we call a buffalo is not a buffalo at all and what is a buffalo is very hard to find a picture of. As my husband said, "Anyone knows that what you call a buffalo is really a bison and that the buffalo that is really a buffalo is a water buffalo." About that time it was the centennial of Bewick who--speaking of graphics men--is, I believe, one of the greatest. So I began looking through Bewick to see if we couldn't illustrate a book with his engravings. Bewick's engraving of the water buffalo reminded us of Elizabeth Hawes' description of English shoes, "Made by someone who had often heard about them, but had never actually seen any." You could see that his portrayal had characteristics of a buffalo, but it didn't quite seem like one. Animals he knew first hand he presented with great fidelity. Furthermore, the only picture that he had in any way resembled a cow was a bull and this complicated my story. Every time I sent off my manuscript to anyone I had to explain that I knew that it was not a cow. The alternative would have been to take up wood engraving and then to develop a style like that of Bewick.

As I went on, it dawned on me that Bewick's illustrations appealed to me nostalgically, but were really not fitted to my generalization. I got all kinds of very nice letters back from publishers saying thanks but no thanks. These really weren't form letters; they were letters. One of them said to me, "--we were surprised to learn that cows have eyes on the side of the head. Are you sure about that?" I felt like saying, "Are there no cows in New York?" Finally one day someone called me up and (this sounds preposterous, but it is true) said, "Art Linkletter has a company called "------" and we think you have something they could use." In very short order I found I didn't have it. They wanted me to teach people how to teach in front of a megaphone or microphone on television. I can't even teach, much less teach people how to teach, so _I_ said thanks but no thanks. But then on thinking about it, I decided I did have something they needed so I called them up. They said to come on up, so I took my cow, buffalo, horse, cat, lizard, lobster, geranium. They looked and said, "Well, yes, but do you think your lead character has any of the characteristics of a hero?" (For sure a cow doesn't have.) By this time I was talking with a woman who had a most beautiful name and that is one of the reasons I continued talking with them. Her name was Corrine Grimaldi. Not only did she have a good name, she was shrewd. She sat there every day and pulled out all the fallacies, all the lack of logic, all the things that kept this great material of a great scientist from communicating because it was in the hands of someone who had missed the boat. Well, the upshot was that on the advice of this very smart woman we changed the sequence to "A horse is more like a zebra than it is like a cow." The generalization has not lost anything, but now I have a wider receiver on it--a broader kind of reception. And it is easy to make a hero out of a horse so I started all over again.

On the day that they were to decide whether to publish this book, it was raining in Los Angeles. Rain is an event for us and it gave me a chance to carry my umbrella which has a lovely long red handle. I went into a building which has a glass elevator. I don't know if you have ever been in such a building, but it seems as though the floor settles down to the door and there are the Hollywood Hills outside going down with the elevator--Fantastic! I never go into this elevator that I don't feel like a child--I want to push the buttons and try the floor over and over again. I came in off the wet street onto a slick terrazo floor and when I finally picked myself up and disentangled myself from the umbrella, my hand was black and blue. I felt I couldn't not talk to Mrs. Grimaldi because that was the day they were going to buy my book! I think that there is a point here: During the interview, I never once felt my broken finger; I didn't feel it all day long; that night I felt it and had it X-rayed and splinted. Sure enough, there was a broken bone of no consequence because it was a physical thing at a time of larger importance than broken fingers. However, the man who was to make the decision had an ear ache that day. He had had an ear ache off and on for months. Even a rest in Palm Springs had not helped him get over it. On the morning of the "great decision" he awakened with the ear ache and stopped to see the doctor who said,--and this conversation I am inventing--"We are going to have to go in after all," which is what they always say in the script. He called the office and said, "I am not coming in after all." Mrs. Grimaldi said, "What will we do about this lady's book?" He said, "Forget it!" The message is: Communication, decisions and plans hinge on so many things that seem to be accidental. So everyone was saying politely, "Well, thanks but no thanks," and as I had other problems, I got on the airplane, went to San Jose, rented a car and drove around all day, taking care of some business there--never once felt my finger because I had a greater pain. My child had been rejected after much, much loving care.

So I put him away for a year or so and then thought about him again because I belonged to a club whose rule is if you haven't sent off your manuscript, you can't come to the meeting. Generally the meeting has something like strawberry shortcake at the end. So one day I put the manuscript in an envelope, no covering letter or anything, and mailed it to a publisher in my own back yard on Melrose Avenue in Los Angeles, not very many blocks from the glass elevator. In a few days, I got a letter saying to come in. The editor said, "Can you do your own graphics? Your own illustrations?" "No." "Do you know anyone who can?" "Yes." "Someone who can do the illustration, yes." "Okay. Here's the phone, call him up." I said, "Well, it is a her." "Call her up." So I called Mrs. Neuhart. She said she was not willing to do the illustrations unless she could also do the graphics. I like a very young person who doesn't hesitate to set her own terms. Now in my youth, if anybody had offered a chance to illustrate a book, I would have illustrated the book without stipulation, even if I didn't know the ruler from a straight line. But today young people have more judgment than this. So she said, either all or none of it. And they said that they would rather not have graphics separated from illustration. If she could do both, that is what they wanted. So two days later we went in and now the book is under way.

Now then, the point to all of this is that although we were talking about a very trivial subject in itself, I think it exemplifies something much larger. Mrs. Neuhart's problem is to be sure that the text and the visual content of the book are well-married, are clear and even implicit, more than just actual in their report, implicit. And that is a hard thing to get across.

In order to make this book, I talked with many, many children. If I had had any sense at all, I would have taped everything they said. Some of the best things they said when I didn't have any tape machine going. I asked a little boy the difference between a cow and a lizard, as we had been talking about cows and lizards. He said, "Well, lizards they lay eggs, but cows--they have the babies straight." If you try any of the European languages for the expression "to give birth," everyone is marvelous. In English, it is "to give birth"; in Spanish, it is "to give light"; in French, it is "to put down little ones." The little boy says, "They have the babies straight."

Later on, as the book grew, I began asking questions that seemed a little more subtle to me, such as "What family do cats belong to?" You know children think a long time and they think by looking backwards; their eye is turned toward you, but it is looking inwards. The boy finally replied "any family." So now we had two problems. The word "family" really has many meanings and Mrs. Neuhart's illustration has to show "biological family" and also "any family." The point is--I'll say it once more--that the message that you send isn't necessarily the one you think you are sending--may even be larger than you intended.

I know you know Eames' old film on this subject. I think I have seen it twenty times. It came out of the Sample Lesson which was in the 'forties. The Sample Lesson was an all-day affair with three showings--continuous showings. You were invited with a card that was about the size of a poker chip with a very strange image on it. Along about 6:30 in the evening, I thought I smelled bread. I was terribly hungry. Of course, I didn't like to admit it in front of all this culture and the history of handwriting, and Eames and Nelson and Gerard all in the same room plus at least seven pictures going on at the same time in front of us. But I kept smelling bread and when I looked around everyone was sniffing. Pretty soon I smelled it getting a little bit too brown and I was nervous about that. About that time, they showed a marvelous old-fashioned Detroit iron oven. You remember the kind? If you are old enough, you do. They have a heavy ornate casting that catches grease but the surface i nice and shiny. Suddenly I smelled strawberry jam. Well, sneaky Eames and his wife had a stove going near the ventilator system or the air-conditioning system and they were sending the smell of bread through it. They did this deliberately at dinner time. There wasn't a soul present who didn't get the message. It was very straight because we had agreed on a set of symbols you know. Everyone understands about hunger and bread and butter and jam at 6:30 after three hours of sitting.

Now I have lost my place again. One time I was listening to Buckminister Fuller who thinks and talks at exactly the same rate and that is pretty fast. He got way out on the edge of what he was talking about and couldn't remember what made him think of it. So he said, "Help me. I have centrifuged myself." Someone in the audience said, "--you were talking about----." He said, "Oh, yes--and went right on. Now I have to get back to what made me think about the message. The text and the graphics must be well-married and the collection or the different collections of information or more importantly, concepts that we bring to a message that is being brought to us have somehow to be included in the concept we present. Then, of course, after facing all that complication we must, I think, simplify what we have to say. Not what we have to say, but the way we say it. Last night we came into Bellingham. As there was television in the room, we turned it on to a woman talking about verbs. After less than ten minutes, I turned her off because she never did get around to what verbs were. I have a feeling that is exactly what I have done and the difference is that you can't turn it off.

I did want to tell you one last thing about the man who said the sentence about the cow and the geranium. I wrote to him after I knew we would be published to say that I thought that we should share the royalties. My friends told me not to be ridiculous, "The next thing you know he will have all the royalties and you will have nothing." But I felt I had to do this, so I wrote to Anatol Rapoport. He wrote back saying that no one can determine the paternity of an idea; the work that made the book entitles the writer to the royalties. So then I wrote and said that I would like to dedicate the book to him. This unfailingly polite and also very succinct man replied that he was flattered that I would like to dedicate the book to him, but would like to see the book before deciding whether to accept.

When I centrifuged myself the problem was over a quotation that I found years ago in a type-sample book. I never can find the type-sample book, but the essence of the quotation is not dimmed, even if I can't give it in the author's words: Anything new is generally developed and interpreted in terms of that which it out-modes. This tendency on man's part to turn back to the old for making use of the new causes early type to look like handwriting, if you want to use a really obvious example, or early automobiles to look like wagons. These are obviously examples, but the limitation of letter press and offset or any of the newer press techniques are just as different from the limitations of techniques they outmode. The limitations of new teaching devices or concepts or methods are altogether different from those they outmode. But we have the tendency to use the thing with which we are familiar as a vehicle for putting to work the new or the unfamiliar. Your vield, like all other fields, is one in which change is not only taking place, but is accelerating. The means by which printed materials are made change from day to day, so it is actually probable that we teach people technique and methods that are obsolete by the time they get to us. Now, if you are teaching the techniques, this is one thing, but if you are teaching something about communicating then I don't think it makes any difference what vehicle you are using. If you want to play with a letterpress or photograms or something very, very elementary, something that could have been done 400 years ago, you are not any longer talking about a technique but a communications problem and it doesn't matter what the technique is.

A great many studies have shown that you can't teach spelling or you can't learn spelling by taking words out of context and putting them in lists. You might make a list of all the words that have 'ough' in them and then fasten beginnings and ends on them so that you get through, though, ought, tough. You *could* teach in that kind of a list because that *is* a *context* list. But a list of words studied as a list will not teach people to spell. We know this and we have developed all kinds of ways to teach outside of the use of the list. However, check any standard textbook for teaching spelling. They all have the proved devices, but in the end there is the list. If you didn't have the list there would be mothers and fathers and maybe perhaps even supervisors who would be upset.

Back to Alvin Lustig--when Lustig was a young man in Los Angeles, Miss Smith said to him, "I think I would like to have a study group in the field of print shop for art teachers." Now her reason was that the art teacher is responsible for designing the program for the Spring Festival or for the Cantata or for the senior play or whatnot in the high school. (At least she was in my youth.) After she says what she wants, the copy goes down to the print shop teacher who puts a busy-bee-malt-shop type layout on it. The art teacher doesn't know it all either. She doesn't know body type from tye type that is used for captions even if she knows there is a difference. So Miss Smith thought there ought to be some way to bring the print shop teacher and the art teacher together. She and this very young man--Alvin Lustig--talked about it and set up a class limited to 24 people, 12 art teachers and 12 print shop teachers. But it couldn't be just any 12 teachers or any 12 print shop teachers; it had to be 1 by 1--an art teacher who would speak and work with a print shop teacher and conversely a print shop teacher who would speak and work with an art teacher. So they got 12 pairs in this class. I remember not being a member of the class but as my husband was a member, I got to watch what was happening--an activity I like better than any other. There were people invading each other's field. Pretty soon they had something to talk about and something to do together. Lustig was trying to get across to them the idea that you don't have to make something look like a Christmas tree just because you are using type sorts which are abstractions in themselves to make a Christmas card. My husband will hate me for this, but he was the only person in the class who caught on and he chanced to be working with a pretty solid type man. They got something out and this little 12 weeks experience between September and Christmas. About one-third of the people in the class may have produced a sample Christmas card. And I don't know what they thought at the time, but I would guess that they thought that was an awful lot of work for a Christmas card you could not even mail out. But the expanding circles of influence of that little class are immense. One member of the class is a big man in one of the television companies. Another came to teach at junior college where I went to teach. Because of that class we had the first type laboratory in an art department on a college campus in Southern California--a type laboratory that was specifically designed not to be able to produce. All you could do was work out whether something could be produced. I owe a great deal to Mr. Hoffman for this limitation because on the day of the open house Mr. Hoffman came. The picture is very clear in my mind: Hoffman said to me, "I know that this is a laboratory and not a production room and I understand that Dr. Ingalls has agreed that that is what it is going to be, but I want to say here in your presence and his presence and with an audience he will try to get production out of you. Even though he has promised not to. Don't fall for it." So, a very major point here is that production and laboratory design experience are two very different things. They don't call even for the same kind of abilities--once in a while you have a young man like Lustig whose press didn't even have grippers and yet he could do seven perfectly registered runs. Of course, I would like to see his trash box. All the time he was producing, he was probably recharging his batteries.

When I first went to the junior college, I didn't have a telephone in my office. One of the women in the business department had a telephone so she invited me to use it. At that time, I was working to see to it that my students had a wider exposure than they would normally get in a junior college. (This is a point I want to take up in a minute.) As I was responsible for getting people to come and talk, I would call up anyone: Garret Eckbo, Sumner Spaulding, Carlos Contreras in Mexico City. (Someone asked me how I got all these people and I said truthfully that I looked them up in the book and called them--it was as simple as that.) After a few days of using Mrs. Moore's telephone she asked me if I minded her telling me that I didn't know how to use the telephone. "You may be pretty good in your field, but a telephone is a blind instrument and you don't come into focus. You take too long to get started; you aren't known to the fellow at the other end. He doesn't know what you are selling. You don't get the picture clear for him quickly enough. You should get your business stated, your request made and get off the line." So after a few lessons from her, I learned how to telephone. I had no secretary at the time because my semester had started a little late. If you don't get a secretary the first two weeks, you don't get one--something to do with the budget or not filling out the form on time, you know, especially in triplicate----. So Mrs. Moore said she had girls who were learning who would be glad to be my secretaries if I were careful and talked slowly. So I dictated to her girls and pretty soon letters would come back to me a couple of pages long, sometimes even longer. Then Mrs. Moore told me I didn't know how to write a letter. "If you write a letter more than a page long, you're redundant; there isn't anything you have to say that you couldn't say in a page. Also, the person who gets this letter thinks he hasn't time to read all that so he sets it aside and he may never get around to reading it. If you can't get it on one page, it isn't suitable for a letter." Well, of course you can argue with her, but the point is that one page is a pretty good goal to strive for. So she taught me to write a business letter. Well, shortly after that she said, "O.K. I have been helpful to you. Now I need something. The business department has all this machinery for communicating and we really don't know what to do with it. For example, they had a machine that would reverse white and black, typewriters that would change to any kind of type face you chose. (That always reminds me of Carlos Contraras who I think has a mind like typewriters and can pull out any language he wants. I don't care what language anyone uses to address Mr. Contraros he replies in that language. So he apparently doesn't think in a spoken language at all. Mrs. Moore was saying that I knew the mechanics of communicating with words on paper; what I didn't know is how to get the words on paper to communicate. And so we pooled our problem and our resources. Her resources happened to be the machinery and ours happened to be something to do with visual know-how. And I won't say that we really knew much, but we thought we did because we were younger than we are now. It is quite a handy thing to be younger--you have fewer doubts. If you do have doubts and you are young, get rid of them because you get plenty later on--give them up for now.

So we set about then to try to provide an enivronment in our school that was larger than that the junior college normally provides. If you have an urban junior college, you lack of the non-urban scene; if you have a rural junior college, you lack of the urban scene. And the students in both instances know nothing of the academic world of the third, fourth, fifth, sixth, seventh year. We couldn't possibly match that or attempt to duplicate it, so tried limited exposure. We attempted generalizations. We decided that our students had been raised in a time of affluence and conflict. We didn't know then what affluence was--those were the late 'forties, but then seemed affluent compared to the late "thirties. The students had never known a time when there wasn't a war. I used to play a fabulous game with them called "druthers." We would make a list of twenty things and arrange them alphabetically and give the students ten choices. They could choose any ten, but they couldn't do any bartering or shifting around. If you chose ten, that meant that you had those ten and any you didn't chose you didn't have. So we said--a car of your own; hot and cold running water; television and radio; centralized heat source; and cooking source; the right to go barefooted; a yacht; fur coat; expensive wardrobe; newspaper. We had made a list of those things to which we have become so accustomed to having that we regard them as necessities. As a result, the things that we claim we desire, we are willing to give up rather than part with something like television. (I just spent a couple of days in rainy Canada and looked at Canadian television. I believe I am going to get rid of my American television.) But still, if you were to ask me, I would feel that I needed television. Well, so then we tried dates in history: 1900, 1913, 1940, and asked things that people didn't have in those times that you do have now. A child in 1913 would never have known a time when there never was a world war. It was really astounding to our students. So then we decided we will make them all ten years older whether they liked it or not. We chose an exhibit called "Depression Decade." We began by locating the most telling magazine of the era--not necessarily the most profound--the most telling, a magazine called VANITY FAIR which went out of business in 1938 because of the political overtones of the time. So we "subscribed" to VANITY FAIR, that is, we bought two of every issue from 1932 to 1938. Then we set a "boy" to reading the Los Angeles Times. He was just the right boy for it. He went down to the library and, instead of doing his chemistry and physics, he did what Ben Shahn said he should do; he spent his time on his art teacher's assignment which at that time was to read the Times from 1932 to 1938 and to pick out what he thought was the best of 416 weeks. The week he got was simply great: Buddy and Mary announced their engagement. Chevrolets were $395.00. Bacon was 11¢ per pound if you bought it by the square. The Hindenberg exploded. Edward renounced the throne for the woman he loved. Roosevelt tried to pack the Supreme Court and couldn't make it; I have forgotten what else happened, but we published a single issue newspaper for that week in the thirties.

We decided what civilization was. (I don't know that we feel the same anymore, but we thought we knew at that time.) We said it was made of art and music. (We divided music into more than one kind. The Hit Parade we thought was significant), theater, politics, and just plain old events that don't necessarily have a political source, sports and fashion. And we included areas such as advertising--I have this stuff on file incidentally. We found the early cigarette ad that showed a girl--Lucky Strike in a green package--saying "Blow some my way." By the end of the 'thirties, she was actually holding a cigarette.

Then we decided we had to set up our show so that people could thread through any kind of information that particularly interested them. So we gave each topic a color. We decided movies obviously fitted on black (that was the day before color pictures), fashions on blue-green, politics on orange. And so then we made a harlequin pattern--actually elongated diamond shapes laced all the way around the room. We treated the space as a time line and we had 1932-1933-4-5 to 8. Then we took pictorial material from each of these topics and fitted it in the color and time it belonged.

Realizing that comment was important, we collected the cartoons of Covarrubias, Garetto, Cotton, and Alajalov. Each of these men had had droll and penetrating things to say about the political scene. We discovered that we really didn't understand the political scene behind the picture of Andrew Mellon with a gold dollar treated as a halo over his head. So we went to the history teacher and asked her to make us a no more than fifty words statement telling what led Garetto to make this particular cartoon.

Or what inspired Covarrubias to make his interview between Frances Perkins and Shirley Temple. (Because there are some people here who are still in their twenties, Francis Perkins was the Secretary of Labor and poor little Shirley Temple was having to work all the time.) So we then had an exhibit of political comment of the time with the most succinct statement of the political scene. Of course, the history teacher was pulled in. (Incidentally, she did a fantastic job and I still have her little summaries.) Then we decided that we really ought to have photographs of the events of the times so the boy who had been reading newspapers listed events he thought were significant, like marathon dances and the explosion of the Hindenberg and such. The Times has 8 X 10 glossies in their file of every major event of the thirties and loaned us whatever we asked for.

We decided that really wasn't all there was to the thirties, but that the thirties represented also, an immensely important European exodus, the fourth European exodus in our history. Incidentally, we found this out when we were doing the exhibit--we didn't know it before that. So we did a very brief but accurate summary of the earlier exoduses. We followed it with a very carefully detailed one of the "cultural" exodus of the thirties with photographs of each of the people we knew about who had come to this country during that time: Writers, scientists, artists, people like Thomas Mann.

When we had completed our project we had put ten years on our students in more ways than one, because this was an all-day all-night effort for a good many weeks. We got a record called I Can Hear It Now--I am sure you know it but if you don't, get it. It was an effort of Edward Murrow's. Someone went through many miles of tape to reproduce actual broadcasts of consequential events of the thirties. We had everything in a small "gallery"--it had been part of the Santa Anna Army Air Base; one end was our office and one end was the gallery. Of course, the walls were impossible so we had made false walls and false ceilings.

Now, I am going to say two more things about it and then we will stop for a while and then I would like to show Lustig's slides. The people who worked on this exhibit were the ones who really were communicated to. As you can see, it's very alive to me and yet it happened about 1950. I still can't forget that we did it. I see many of my old students and they almost never fail to mention the exhibit. The people who came to see it because they had contributed to it, say Dr. Bailey in the history department, were moved in a broader way than if they had not helped. Now this is an old, old PTA message, but it is that involvement is the best communicator.

I think systematizing the material on the kind of either-or basis was something we did almost by accident. We didn't realize what we were doing, but we were feeding the material into a certain kind of channel so it could come out a certain way and sequencing it so that it was easy to go back to, or come up with or reinforce. And then we had peripheral support --I am not sure that is the right word, but anything that we showed on our graph we presented outside the graph in larger terms. It was like a map on which you are trying to locate Bellingham. If you go over to A-23, there it is.

We didn't do anything new and we didn't present any new information, but I have a feeling that there were many new messages that came out of it, because the viewer brought certain things with him--his conditioning to affluence and conflict, for example.

We included a unit on fashion because fashion of the thirties was rather polite.

It was a time when women rose up and said that all children should have a hot lunch; the time of the navy blue suit, the polka dotted, ruffled vestee, the neat shoe, the "lady-like forceful"--a lady-like manner in front of a forceful viewpoint. If you were to look through the fashions of the thirties up to about 1937, you would feel this mood. Now, if you look at fashion galleries like the very fine one at the Los Angeles County Museum, there is a different level of report, but the fashion we were talking about was more common-place--in a good sense of the word. And we saw something in the sequence that none of us had seen before or expected.

It is not necessary to talk about Alvin Lustig--I think he was unique, but I would guess that it is like Rapoport's comment on ideas--people like him spring up in lots of places. They may or may not have an opportunity to record what they think about and have their thoughts saved. It wasn't merely a coincidence, you know, that Lustig knew Miss Smith or knew Powell or knew Ward Ritchie. There is some kind of magnetism that pulls people together. I will give an example about that and then I want to tell you one other thing. Lately I heard John Cage talk at Aspen and then discovered that he and Ward Ritchie were roommates in college, and that when Ritchie was first in his old house on Hyperion which is near the Silver Lake area in Los Angeles--a big old place with Ritchie's presses and Cage's piano in it--Cage was working away to the noise of the presses. To Cage, this is a perfectly reasonable thing to have happened. Any number of people who know each other through some kind of gravitational force. (I must say I feel fortunate that someone still has a collection of Lustig's early stuff. I had mine for years, like my Japanese fish; isn't lost but I just can't find it.)

Now I would like to tell you of another kind of communication exhibit which we did that I think was a generalization with a different kind of organization. We decided to do a thematic show called Pride and Joy. We intended to show how parents love their children. So we asked ourselves what are all the ways parents use to show they love their children. It turned out that they buy them outfits like their own and get dressed up the same way or they buy them equipment like that which they use either for play or for work. Thus, the little boy has a hammer and daddy has a hammer. Or they buy them outfits that symbolize the kind of life that the parents think of the child as being happy to lead, like roughrider or spaceman or indian. They buy them the outfit for the talent or skill that they would like the child to have like a football suit or chemistry set. Generally, too, the mother sees to it that the little girl has things that she associates with herself as a child growing up to be a woman. So the little girl has a sewing machine--which probably doesn't sew--and a stove and kettles and so forth. In addition to this, parents have pictures taken of their children in a kind of life the child never really lived. In my vintage they were on very elaborate upholstered chairs with a Christening dress miles long. Parents buy gear like baby buggies of consequence or cribs or cradles or whatnot.

Instead of pointing at children of this era, we chose the past and categorized all these ways parents have of showing that they love their children, collecting the gear of another era for demonstration. We collected it from various places. Some of us just happened to have it. It's like Boston hats, you know--you don't buy them, you just have them. So we had wonderful cradles, highchairs and baby buggies with parasols, fringe and dimpled upholstery. We collected the hats of the outfits that children wear. Today they would be clear plastic domes or scout hats, or cub hats or hats for any kind of role that he would play. We went to the museum for christening gowns and a dress my father had had. His was not in the museum, but we got one like his there. There is hardly a man now alive who would have been caught dead in it. It was tucked and pleated and had lace running all the way down and was belted slightly below the midriff and hit him about knee length and was worn with black stockings and button shoes. It would be for a child about eight and made of lovely, lovely thick white cloth, probably a serge--a creamy serge and had a hat to go with it.

We got the whole exhibit up and then we set about looking for examples in "literature" that show how parents love their children. The three we thought beat all others were first, a story by Bernard Jones about the little boy about fourteen months old who could not talk, but could drink from a cup. The neighbor's child, who could talk, was still on the bottle. Then there is a fantastic story out of Nicholas Nickelby about the father whose little girl is dancing the ballet on the stage. My husband has always insisted that Dicekns is not funny, but I brought him low with this story. It is so sad and awful and at the same time so funny. The observer's description of the father's reaction to the little girl dancing--no re-cap can do it justice. Read it! The third story is from Freckles by Gene Stratton Porter, which is great if you like milk toast and cambric tea--mild-mannered slush. In it is an account of how the bride knows that the groom's mother must have loved him. (The groom is a foundling.) So we put this all on the all and then wrote a little paper saying how parents show their love for their children. We were so pleased with ourselves that we called in the English and Psychology department for an exclusive preview. They all looked as if they had been hit with a wet fish so I asked what the trouble was. They said, "You are going to make everyone feel just terrible!" It turned out that we were saying that parents say, "I do too love my children! And this is how I can prove it. See all the things I do for them!" We were suggesting that all these gestures that we do and make for children are substitutes for love. This, of course, was not our intention at all. The message we were trying to get off was how we say to others that we do love our children, but we had sent a message entirely different than the one intended. So then we had to restructure our exhibit to make the point that love is a thing that is hard in our society to express, that intimacy is fragile, and that we have a kind of what I tell my husband, is a Protestant-Catholic ethic, in which interlocking forces that make it difficult for people to say "I love you" to their children without reservation. So they make all kinds of substitutions--not substitutions, more properly, demonstrations. So we restructured the meaning of our show and tried to leach out its bitterness.

I forgot to say one other thing--we went through photograph albums and collected families of the past. We had one whole wall of this fantastic other era. I think it was a telling kind of communication and I go back again to my first point. The people who did it were the ones who received the greatest communication from it. And the calling in of outsiders who were not involved in the actual production but could speak honestly to us was essential. We might have asked people who would have said, "My, this is lovely! Great!" and gone away with their feelings hurt. Instead they were able to say, "You are doing your audience a disservice; you are hurting people's feelings pointlessly. They can get the message of the falsity of substituting things for love without being stabbed.

I feel I have talked anecdotally, endlessly arguing that teaching is more easily done with anecdotes and demonstration and actual experience than it is from abstraction and yet, here I am back to the example. When I first worked on NABOB (the name of my book) I checked out a fantastic book by Storer, called ZOOLOGY. If I were on a desert island, I would feel that I would have to have that book--because I am not a zoologist. If I were a zoologist, I wouldn't need it. Because I am not, I would need it. But, if ever graphics did content a disservice, it is in this book. If anyone of your students should redesign this book while I am on the desert island, I would be very upset because I would want the copy with a marriage of information and graphics myself. In the present edition, the graphics actually tend to hide information, more particularly, relations among data. Also, people who deal with words rather than with "looking at"--you know, people who talk about looking at--often use words either to hide meanings or to hide absence of meaning. There are some fields (and zoology would not be one) in which words are used to hide the absence of meaning. In zoology, they--I started to make an accusation, but I believe an accusation is not called for. It is instead that the people who are "in the know" use words like "hypogynous" and "viviparous" because these words are interlingual. I read Storer for sometime before I found out what hypogynous meant. After you know what it means you say, "Oh well, that is like the geranium. Viviparous is perfectly obvious to any of us, but you could just as easily say 'bearing live young'!" People who deal with words like to complicate with abstractions instead of using demonstrative words.

It happens that English is the most demonstrative of all languages. It has the greatest vigor. (I mean of all European languages, I don't know about others.) If you wish to read something on this subject, the book to read is Otto Jesperson's The English Lanugage. I brought a copy for anyone to see. I know that people pick it up and cannot put it down. A book titled The English Lanugage that you can't put down has to have something! Of course, Jesperson is in love with the English language and he communicates that to you. The English language, as I said, is a demonstrative language--a good language for speaking. The spoken and written languages were very closely allied until the nineteenth century.

Now then, if people who deal with words could hang on to the simplicity of the spoken language and people who deal with image would cease to depend on an informed elite for understanding, we could get some where. I believe that we tend to get a kind of secondary communication: On paper--scientists talk to each other and people who deal with the visual arts talk to each other, but they don't necessarily send messages outside their own groups. It is a dreadful trap, the trap of restricting the visual appeal, that is, the visual message, to people who already understood the message before you sent it. With words, the trap is restricting the message to those words understood only by persons who already understand the message. The elimination of those two traps and the merger of spoken and visual language is the goal. In the achievements of this goal, George Orwell is the scientist's best friend--I don't know who is the best friend of the graphics profession. I'm here to find out.

# LECTURE 2

I am going to do a three minute recap of what I thought I said yesterday in order to indicate (1) how much redundancy there is. It took me about two hours to say what I think I can say in about three minutes, and (2) to reassure myself that there was some organization to what we talked about yesterday. First, the message sent and received is not necessarily the same. The one you think you sent and the one you did send are not necessarily the same. And then messages are subject to interpretation--subject to what people bring with them to the message. The VW billboard out now says that it will not drive you to the poor house. There are people seventeen or eighteen years old who have no idea what that means. I believe they like the board just the same, but in my vintage to be driven to the poor house suggested that the mortgage had been foreclosed--the family was down and out. And then, of course, messages get garbled. That is one of the reasons we have redundancy--to protect against garbling. Next, teaching has the problem of assumption. We assume, for example, that teaching takes place. I really believe it is more likely that learning takes place, not teaching. We take credit for the bright, able, industrious student--a presumption on our parts. I believe, if anything, teaching almost takes those qualities out of him. We assume the student who drops out of school is lost--that education didn't happen to him and, conversely, if he had stayed in school it would have happened to him. And that is not necessarily true! I know it is fashionable to be in favor of the dropout; I like to be in fashion and I am in favor of the dropout. I was comforted just the same to be at Aspen and hear people like Ben Shahn whose opinions are valuable rather than fashionable, say that the students who interested them the most were those who either were dropouts or were constantly threatened as dropouts.

I believe we could learn about the mean by studying the extremes. If you really wish to know about storage, find out the storage problems at a dormitory. If you can solve dormitory storage, you have storage problems solved. Learn about the extreme in order to learn about the mean. And I believe I need to inquire why does my student and friend (en route to the dropout office) say to me, "I can't stand your class." He says so with complete friendliness. We were having coffee at the time. How does it happen that now he is -----'s right-hand man. He is very, very able, very serious, very talented and totally unwilling to put up with the mundane.

Next, it doesn't really matter who shot John. What really matters is what led up to the shooting and what were the consequences. Demonstration! Lustig's little class for art and print shop teachers. There were only 24 people enrolled. No one got a Christmas card out of it; only one person I could see in the room caught on to what Lustig was talking about--and that was not I. I knew vaguely he was talking about something important, but I wasn't able to identify it. I couldn't put down what he had taught us. That class happened in 1936. Lustig's influence is vast and pervasive in Southern California. So it doesn't really matter that it was Lustig or what the situation was. The important thing is what came of it and what led to it.

Yesterday, Mr. Tara asked when "graphic design" became a term? I judged the fifties but I have tried since to go back in my mind about this term. I went to the junior college in 1947; we opened our graphics lab in 1948. I told the boss I wanted a graphics laboratory. He wished to know just what I meant by that.

I tried to explain and realized that I couldn't define graphics clearly enough to say to him what I wanted. The dictionary wasn't any better able than I. And then I called up all kinds of men in the field of printing like Ward Ritchie and Sol Bass. I had had the experience of the business teacher by then and didn't hesitate to call anyone. We ended by deciding to present a graphic arts major. I won't say it was successful as a venture, but we did open a laboratory in 1948. Someone had to use the term "Graphic Design" before that or I wouldn't have been using it at the time. I believe what we were trying was successful in other than immediate terms. But then, almost everything we do is, if it is really successful; real success doesn't show.

Yesterday, I had three generalizations to present. One was the generalization of Dr. Rapoport's about the horse and the geranium. Correspondence with Dr. Rapoport told me some things about him as a person and a teacher that we could all use. One was his attitude toward copyright: No one can trace the paternity of an idea. And when I said I would like to dedicate the book to him, he said that he was flattered but would like to see it first. Yesterday, on returning to the hotel, I found a letter from Dr. Rapoport. I am just vain enough to read you some of it. He says, "It is indeed a charming and profoundly instructive children's book. Have you thought of other taxonomic series?" (I didn't even know the word taxonomy, and had to have my husband tell me.) The second generalization was on the thirties. I was trying to say (1) that our sources were primary and how we used them. (Although not primary in the English literary history sense they were primary in the sense that they came from the era.) (2) That we worked out a system of codification based on topics of general public significance--sports, music, theater, politics, etc. (3) That we used a visual and referential cross hatch system so that people could move from here to here and stay on a train of thought. (4) That we got anecdotal support using Vanity Fair. (If you don't know Vanity Fair, you really should; it is an era gone that shouldn't be.) And, of course, Covarrubias and the news morgues and files. And then we relied on outside help. This last is difficult to say with humility: I like outside help, but I don't believe I like outside direction. And I think the same would be true of history teachers also. They would say to me, "I would like your help but please don't tell me how." Now we were extremely fortunate to have access to help that didn't regard itself as our mentor. Information or advice came as help rather than direction. I mean direction in the sense of telling you what to do.

Best of all were the bi-products of the exhibit--the things we didn't expect. An example: Insight on fashions of the thirties--fashion for most people, not the fashion of the Duchess of Windsor which, of course, is not the fashion for most people. The fashion in the thirties was sociologically interesting and our new understanding resulted in a course offered later at the junior college. The course dealt with the advantages and limitations of standardization and the difference between part to part precision and that based on interchangeability. Under the system of standardization, we are better fitted in clothes than we would have been having something made to order as, say, George Washington did. If you have never read any of Washington's letters to his solicitors, you should. "I wish a pair of shoes with silver buckles a little bigger than the last pair you sent me. The last pair was rather tight. I would like also a book on how to get rich. I understand there is one." You know, a long string of things he wants including a bed a little longer than the one he ordered before.

Everything he buys "to order" (custom) really doesn't fit him. Today, unless you take a size 37 shoe, you are far better fitted on a non-to-order basis. In the thirties, of course, production of clothes and goods for groups really began. Today, if you are 6'5" and wear a size thirteen, quadruple A, you can get shoes and shirts to fit you. Of course, all the people that are 6'5" don't live in one place, so they buy by mail. The place to mail to is Maine, but that is not the point. The point is that a kind of clustering that grew out of the thirties, a clustering was apparent to us in the development of the fashion section of our Depression Decade exhibit--and fashion was only a minute element of the show. (5) That coincidental situations are inherently full of resource; if they don't seem to be full of resource, it is merely that we fail to observe. A man has an earache; I break my finger; the publisher doesn't buy the book. It seems like a disaster to me and in immediate terms it is! But in the long haul, something good emerged. Having to have my telephone in someone else's office on a low table because there was no desk, leaning over, trying to phone and write at one time (I am tall), feeling awkward while looking at photographs on the wall demonstrating how not to behave in an office--well, everything about those phone calls in the business teacher's office seemed disastrous to me. The coincidence was that of being in the presence of a woman who knew (1) how to make a phone call, (2) how to write a letter and (3) how to use but not what to do with all kinds of communications equipment. This coincidence brought our two departments far closer together than some meeting would have done--a meeting that said, "Now, let's get the business department and the art department together." From an inconvenience emerged some very good things.

That leads me to something back to Lustig. (It seems as though I have Lustig on my mind, and I have had for a week or two.) When he taught at the Art Center School, which is technologically quite expert, and he and some staff members got in a huff and left the Art Center School, going to a newly founded school, which I believe, was called the California School of Art. Later, we heard Lustig talking about the situation. He said he was in a dilemma, for the students at his old Art Center could do everything, but they didn't know anything, while at the new school the students knew everything, could not do anything. He wanted students who knew something and could do something. I believe that probably the graphic arts field would draw its greatest power from such persons.

The point I wanted to make when I subtrefuged myself was (6) that the difficulty with the new is that it is usually interpreted in terms of what it outmoded. The sharpest and best progress is made when there is nothing with which to compare, when the start is from scratch. The presence of old patterns clutters the view of the new.

The third generalization was that of parental demonstration of love for children titled Pride and Joy. We intended to show how parents demonstrate their love for their children, and inadvertently showed that parents go around saying, "I do too love my children." With the help of the English and psychology teachers, the cruelty of such an exhibit became clear to us. We did not redesign the visual presentation, but we did redesign the viewpoint that supported the visual. We came away realizing that parents may be like the artist who, says Henry Wolf, is a person with too much love to give and too much reserve to give it--or is really shy about loving. Like other shy people, he looks around for something else to give to show his love. The artist gives work, frequently giving it to the people who understand it the least. Now, he doesn't give work as a substitute for love; he gives work as a demonstration of love. The committee working together on Pride and Joy (we were not a camel-designing committee) decided that the problem we faced in this particular generalization was the confusion of the word substitution and the word demonstration and that parents we spoke of were giving love, their demonstration of their love being those things they gave or did for their children. It was not our province to say that demonstrations might become substitutes.

One time I said to my little boy, "I really don't care what kind of grades you get, I just want you to learn!" "Yes," he said with childlike sagacity, "but you really do care." He knew in spite of all my protestations that I did want him to get all A's and be an independent forthright student just the same. So parents came by to look at the exhibit and some thought, "I have done exactly those things," and they withdrew the message from the exhibit themselves without having the finger pointed.

The last point I intended to make was that the fields like graphics (or any of the informational conceptual communications fields such as science) tend to get in their own way. We actually often use words to hide meanings or sadly to hide the absence of meaning. We use graphics to convince without informing, or to attract and startle and sometimes not to tell what we are trying to tell. And then, because we as a group are on a kind of a plateau (or are a slice of society) we talk to people who have the same kinds of exposures we have and thus can feel like successes. Example: I have been interested for a long, long time in Bentwood furniture. One year we did an exhibit of chairs. I asked my students to tell me what a chair was without describing a chair. It is a way to give ulcers; hardly anyone can tell you what a chair is without describing one. I had one very astute student who said, "A chair is a portable device for taking a load off the feet and placing it elsewhere. It may or may not have a back." Well, we argued that and decided that it did have a back. If it didn't have a back, it would be a stool. Well then, it may or may not have arms. Then we decided it wasn't necessarily portable. We then decided that there was a variety of reasons for sitting and that the reasons for sitting reflected a culture. So we did an exhibit of chairs. I had recalled seeing one of the Thonet rocking chairs when I had gone to the caner to buy a strip of cane. He said, "Yes, that will be three cents." This was in the thirties, and he was caning a rocking chair that looked like a large-scale piece of handwriting. So as we did the chair exhibit, I decided I would go find that rocking chair again. It was a wonderful piece of detection. I finally found the man who was no longer a caner, but still had the sign on the door--a sign made of little tiny bean clams that live in some Southern California beaches. They were set like mosaics. The caner and his wife got out old ledgers and finally located the record of the chair. It belonged to a maiden lady. When we tracked her down, there was her fantastic rocker. We started our exhibit with this lady's Bentwood rocker.

Thereupon I began to collect advertisements with Bentwood furniture of some kind in them. I believe I may have 1/10 of what is in print. Any my stack of tear sheets is about 4" high, all of it pages of advertising or editorial pages with Bentwood furniture: Chairs, stools, hatracks, tables, chaises supporting ladies out in the field demonstrating lovely sheets, bar stools. I can't begin to describe their variety and complexity. One day, on request, I showed them to a group of non-graphic people. I had planned to do an article. Not a person in the room had ever seen any of the material. I had taken it all from Ladies Home Journal, McCalls, New Yorker, Look, Woman's Day, etc., and not a person had ever seen one. Now the point is that what communicates to us is a kind of frame of reference within a frame of reference and because it communicates to us, we believe it communicates to everyone. That situation doesn't diminish the Bentwood chair. You see, Bentwood provides invisible scenery--noncompetitive, invisible props--and that is fine. However, anyone in graphics, architecture, or industrial design would have been aware of the ubiquitous Brentwood.

Yesterday, Mr. Tara said that he had done his homework so I thought I ought to have homework of my own. It weighs quite a lot, my homework. It is a collection of materials that I believe are valuable and should be saved. If you set about to gather this kind of material, you should frequent the Acres of Books and second-hand magazine stores and Goodwill Industries and places like that. If you buy these materials new, you are usually obliged to buy all the stuff on each side of them that you don't want. But, if you buy them second-hand, you buy only the issue you want. I regret to say that most of mine came first-hand, not second--unless I lost them.

Today we are supposed to be talking about the recognition of the interrelation in the editing and presentation of graphic and textural materials. The suggested mergers are text and illumination, type use and textural emphasis, and referential information and outcome are action. I am not really sure what it means. But I can give you demonstrations. When I taught at the junior college, a very able designer came to take our night class. We had figured that if we offered the class at night, we could get some outsiders in the graphic class, and thus secure enough enrollees to keep the class alive. We had a very simple practical goal: sixteen enrollees by the second meeting of the class. We knew we had seven or eight students who would take it; if we could just get seven or eight outsiders, we would be in business. The larger outcome never occurred to us--that is, the fantastic influence of people who are actually in the field, designers on a busman's holiday who just wanted to take the class so they could play around with type. The kids didn't know what kind of a world they were going to get into and the most they got from the class was not what we were trying to teach them, but exposure to a larger world.

Members of this class worked on the design of the cover for the school catalog and one of the outsiders came up with a beautiful answer. However, the man who made the decision as to whether to use the cover couldn't see its logic. And this in a way is one of the troubles with a field like graphics. The designer is not like the medicine man who decides what you have and also decides what ought to be done about it. In graphics, the man who decides what you have isn't necessarily the man who decides what should be done about it. As for the catalog, we would ultimately get a reasonably good cover, but the inside did not live up to the promise of the outside. The magazine world does a better job with this problem than other publishing worlds do. Take Look--it doesn't promise you much in the way of content, but it delivers visually what the outside says is going to be delivered. Graphically, Look is pretty exciting, but the content is something else. Yesterday I mentioned a book by Storer, a zoology book for the non-zoologist, but a book that must hurt the eye of anyone who knows anything about graphics--so painfully ugly! The graphics, in this case, are really not graphics in the sense we use them here, but the book has been printed.

The appearance of a page in Storer in no way reflects the structure of content. Decisions as to which type face or points would do which job had nothing to do with the relative importance of content. That is, all the same kind of material, or the same level on the scale of importance is of the same size and kind of type, but there was no concern for scale, impact, separation, or emphasis. A reader cannot make a visual search for relationships. I don't know that this is clear, because it is so hard to talk about looking at--but, in this case, every decision was logical in the sense of consistency. The publisher and the editor and whoever did the graphics were trying to get as much information on every page as possible. The book is about 900 pages long, and that is enough to frighten almost anyone--worse than Gone With the Wind. Next, the language of the field tends to confuse the reader. I am not against the language of the field, you have to have it. In a way, the language of the field is a form of shorthand, a kind of reference. If you know the word "gen" means "origin" or "birth" or "beginning" or "produced," you can work through lots of meanings of words. And the same way if you know the word "pod" means foot, that word when a part of other words gives them meaning. But the language of the field when used to inform people who don't already know intrudes on communication.

This morning I listened to a group of people talking about the difficulty of teaching the student who is entering the field of the printing world. How to give him a background broad enough to serve as a basis for good judgment, but not so broad as to make inroads on time needed to acquire skill in his field. How do you get a program that does these two things? I don't know, but a contribution the graphics people can make is an effort to get the field of specialized language to simplify itself.

There should be a marriage of clarity in graphics and clarity in language. We need to disabuse ourselves of the Victorian tendency to believe that something is more interesting if you doll it up, put eyelashes on cows, you know, and make mice look like people, print flowers on paper towels. Let us assume that substance is interesting and doesn't need to be made interesting. Now, we should get to a point at which we rely on clarity of purpose, clarity of graphics (image), and clarity of language, all to come together into a common clarification.

Obstacles in the way are of our own invention. It is assumed, for example, that school is dull and difficult and that if you aren't working hard you aren't learning. I believe that this isn't true; I learn the most when I am not working hard. There is a school in Victoria called DURANCE. Marvelous! The children in Victoria are in DURANCE VILE. You have to be of Victorian origin to think that's as funny as I do. A major inheritance we have from the Victorians--not the Canadian kind, the nineteenth century kind--is the irresponsible passive. We can't come right out and say that we decided. Instead, we say, "It was decided by the group." Now this is a polite or devious or an irresponsible way, depending upon whose position you are taking, to say, "You have to pick up the trash--we decided that you have to pick up the trash." A gruff approach when put this way. So we work it around to say that it was decided by the committee. Now you see, no one has to take the blame. "After all, I was just one of them and I had to go along with the group." Now, of course, we didn't decide that we have to pick up the trash; that wouldn't call for a decision. By the time you have gone through all of this language, you have muddied the purpose. The purpose was that the campus be clean. Further, it is our pleasure that it be clean. So the Victorian heritage of the garbled, muddied, indirect, verbose message, has filtered its way into all kinds of communications.

When we were in Denmark, we rode on the second-class train between Denmark and Sweden. Standing in the corridor was a very pretty, young girl who could speak English. I said I know of only one person in Denmark (she had assumed that I was Danish), and his name was Otto Jesperson. She had roomed with his daughter in school, so we talked about Jesperson and what he was like personally. He was probably the world's greatest linguist and even spoke Icelandic which is so close to Middle English that you need not translate Middle English if you can speak this language. Icelanders don't believe in corrputing the language by the intrusion of other languages. If they wish to say telephone, they say "thread talk." They don't bother with "tele" and "phono." Jesperson believed that the English language has a quality over and above qualities of other languages. It is essentially a masculine language, a flexible language. Take the words for man or woman and the implications resulting from added endings: Manly, manful, womanish, womanly. Here is a language that will do anything you want it to do. Please read The English Language. Unless I miss my guess, you can't put it down. We can feel good about this language! The French are proud of a language that cannot rhyme freely; what can be done in English is infinite.

The next book I would commend to you for your students more than for yourself, whether they are graphics students or English students or whatever. Weigh the Word, published by Harper. The authors, King, Jennings, Stevenson (King and Jennings helped us on exhibit Pride and Joy.) They really understand words. Demonstration: At the junior college, we ran a test that takes each student an hour and sorts the blue-birds from the red-birds, as they say in second grade. The faculty discovered that the sorting was not precise. You have more than one kind of blue-bird. They had to sort again. They kept sorting and sorting until they found that as freshmen entered, there were about four different levels of English skills represented. Scheduling was done on a basis of scores, except that everyone below a score fell in one group. Then there was the problem of finding a euphemistic name for saying "you are terrible." Then the staff observed that there wasn't a clear correlation between test results and the student's ability to perform. So they tried to establish where the correlations lay. A person could score quite well, if he knew how to punctuate and spell and had a pretty fair vocabulary, so he would be put in the upper group. However, such a score did not indicate that he could reason, or grow, or learn or present an idea. And so, the staff began studies to find out what parts of the test were most significant as bases for placing students. Of course, over a period of ten years, they gathered a lot of students and records of students. As there were only four or five people in the English department and they were a close knit group who ate lunch together from choice--they were able to pull out some pretty fair inferences, not conclusions. They decided to make a manual to show their students that they knew so much more than they believed. (We all bring much more to a situation than we are aware of.) Students do not trust themselves for fear of being laughed at. Title of the manual is Consider Your Words.

We used to put a caption without its cartoon on the wall and then ask the students to describe the cartoon that went with the caption. We finally found an answer containing every bit of information you need to know to pose the question. We had some students who could get it. So--I want to know the question that goes with this answer: "Yes, we do, lady, but only to other baseball teams." I will tell you only that the first time we did this, there was a fourteen year old boy in the room, almost too old but not quite. He had the answer in minutes.

May I tell you two other examples of cutting away things that don't contribute to the solution--that is what I believe I am talking about.

Some years ago, a man from Long Beach State College called me to say that Buckminister Fuller was going to be there for a seminar. He wondered if Industrial Design would buy an article on Fuller and the seminar. Now, he was a lot subtler than that but that is what he really was saying. I was dying to see Buckminister Fuller for a whole week so I said I knew they would. So they asked me to come for the week as an observer without charge.

So I would like to tell you how Mr. Fuller ran this seminar in order to show you some ways there are to cut away the non-contributive, the extraneous, the superficial, the nothing that takes up room and time. I received from the college a little card that said, "Enter at Gate 23H." When I arrived and showed them my lavender card, they said, "Park right up there." Now this is a college campus where people fight to park; they tie bicycles on their cars and park down by Belmont Shores then pedal over; they sneak into the faculty lot and pretend that they have a faculty sticker on their car. When I drove up to Gate 23H and showed them my lavender ticket, I thought there was a mistake. In the assigned room someone said, "Do you know everybody here?" As no one knew anyone, it didn't make any difference. There was coffee and tea and fruit. We all began to drink and ask who knew what. No one knew anything. Then Mr. Fuller arrived and said, "We are going to make a bamboo dome. It has to be up by Saturday. The one thing we do need now is someone who can cope with the press releases." So Miss Schoof said, "I'll do that." Then he started talking about spherical trigonometry. He held up some sheets of mathematical figures and asked if anyone could blueprint? He talked and talked and talked, till about 12:00 noon when he led us to lunch. We all went to a charming room with a smorgasbord laid out. Everyone picked up a plate, took what he wanted and sat down to eat. When it was over we returned to the room we had left which no one had touched. I forgot to say that everyone of those involved had a parking place within fifty feet of the room we used. No custodian came into that room and disturbed anything we worked with for one week solid--unless he was invited to do so. The only line we stood in at any time was our own line at the smorgasbord. We had a telephone with its own dial tone. And at the end of the first day's talking, we went to this same room for supper.

About 8:00 we met in a huge auditorium absolutely full of people who didn't know what they were in for. If you have never heard Fuller lecture, he talks at the rate he thinks which is very rapid and he speaks in a combination of demonstration and abstraction that wind up like a rope. He tells you something that you couldn't possibly tell anyone else, or at least that is the way I feel about it. Yet, all the time he is talking, you feel as if you understand him perfectly.

So he talked about shelters, shelter in India in particular, the mathematics of the Geodistic Dome which some of us have heard many times and gradually the audience filtered out. About 10:00 all the people left who came because they were supposed to go to a lecture in support of some class they were taking--(those people feel that two hours make a lecture and they leave). About 11:00, the businessmen and people who have kind of an intellectual interest leave; they have to get up in the morning. Gradually, various groups leave until about 1:00 when only the people who came knowing what they were in for are left. Ultimately, Fuller and several others go off some place and have coffee or beer or whatever they have, and finish the night.

Next morning, rosy cheeked, white domed and wearing glasses with a rubber band holding them on him--in came Fuller, fresh as a daisy. He started in again, telling us more about spherical trigonometry. About 1:00 he wrote on the board a list of kinds of activities that were necessary to get that dome built. I can't recall any of them except that one of them was mathematics. Then he said, "Now you know all about spherical trigonometry--I just told you. And there really is no pressure here. Things are fine. The main thing is, we have to have the dome up by Saturday. I believe I'll leave you now." He left and there were not enough wet fish to go around! Everyone looked demolished. Not exactly in pain, you know--something different. Pretty soon a man said, "Well, I can't take this. I am a businessman. There must be a distribution of abilities in here to fit the 'careers' he listed. Who knows anything about math?"

Back to these bearded children! There was a bearded child in the room who happened to be my neighbor's son. He was about nineteen, and had that Nordic flush and the pale golden beard. He said, "I know a little math." So he and a few older people set to work. It turned out that this kid was an intuitive mathematician--he could just do this stuff. I am assuming he knew what he was doing, but it didn't seem as though he could have done enough math in advance to know what he was doing.

Mr. Fuller had left shortly after 2:00. By 6:00, things were moving smoothly. It turned out that among us was a boy of Japanese extraction, engineering student who had been raised in a truck farm and who had relatives in the fishing industry. If there was any kind of a knot he didn't know how to tie, it didn't exist. He figured out the appropriate lashings for putting the bamboo together and had made samples of every step to get from zero to the knot you were looking for. Someone had located the bamboo sources in Long Beach (I didn't know they existed), had a sample load of bamboo delivered, and had actually mocked up the first unit of the dome and built the first three trestles. (The dome had to be built without any tools and without people ever leaving the ground, even though it had to be about seventy feet high.) We had called the arboretum. (I got to make the call; my husband thinks that is a huge joke because I rely on the telephone.) I said, "We need information about bamboo." A very clear voice said, "Our bamboo expert is in the field, but we will have him call you."

It turned out that the people who know more about bamboo than anybody are in Clemsen, Georgia, so we called Georgia. I couldn't believe it, because for everything I have done in my life, I have had to have a D. O. I couldn't even buy twenty-five cents worth of stamps without a D. O. If you don't have a D. O. up here, you have something comparable, I am sure; it is a thing that comes in quardruplicate in four colors. If you just have the wrong color they won't give you the stamps. The man who is the hardest to find of anybody has to sign it. Then it has to be countersigned by the man who is even harder to find than he--probably the fellow who runs the student store. But in Fuller's seminar we could pick up the dial tone phone and call Georgia and say, "I wonder if we could have your monograph on bamboo or whatever."

Everyday until Saturday, everyone did as he pleased. Along about Friday, you could see that this dome had a possibility of being finished. The system they used to get it up, of course, was to build the top first on the ground. Then put the top on a trestle. (This is probably old stuff to men, but to me it was a big charge, like raising the roof in colonial days.) Then they put the next layer around it and put that up on the trestle. The whole thing didn't weigh very much, it was bamboo. They kept lifting it and lifting it until finally it was a dome--a bit conical, but a dome. Halfway through the thing someone climbed on it and broke two of the sticks. I belong to the era of don't touch and he broke it. (One of the reasons that women carry purses is that they have been instructed not to touch anything. They have to have something to do with their hands. Watch a woman down town without her purse. She can't decide where to put her hands.) So the idea of climbing on something or stepping on the grass is beyond me. There was a wonderful cartoon in a recent New Yorker, captioned: "Now see what you have done!" It shows a little girl standing on the world. She has tipped over a bottle of ink, and the world is covered with the ink the child spilled. That is the feeling I have if anything gets broken. Look what you have done! So I was hysterical over this fellow climbing on the dome and breaking one of the sticks. There was a young man collecting the broken sticks and putting new ones in. He was busily writing on a tag which he tied to each stick. I said that it was too bad someone was foolish enough to climb on the dome. And he said, "Oh no! People will inevitably climb on it. If nothing had broken, that would have been an accident. What we need to find out is the circumstances under which things break."

He was tagging every broken stick with information as to when it broke, what was going on--e.g., a man climbing on the dome; what position it had mathematically in the structure; and the character of the stick that broke. When he finished his report, it was apparent that one circumstance of breakage was unevenly cured bamboo; those sticks which were cured the worst were the first to break. Poor curing is quite evident in the appearance of bamboo; when you stack and cord the bamboo, significant differences emerge. Second, circumstance was that certain positions in the structure are subject to a greater torque than other positions; bamboo being a one-way material gives in to torque, so we had to use a stronger, possibly larger member in that particular position. When he finished, they knew as much from breakage as they had known from anything else. They had learned by allowing for the human tendency to climb on and touch, etc.

By Saturday we had the dome up. (When I say "we," you understand that I didn't lift a finger.) I was entranced with the fact that here was a man (Fuller) who I am sure has never had an education course in his life. He left no obstacles in the path of learning. He got rid of all those things that use your time but don't move you forward. The process turned out to be the thing he was doing. We have a tendency in our society to confuse process and outcome at the expense of outcome. Gum chewing is a good example. Chewing is for the purpose of getting something swallowed. You almost can't swallow gum. And all kinds of design process get in the way of the reason for them. Even the process of learning is sometimes given precedence over the reason for learning or the outcome of learning. And here was a man who merged the goal of producing the dome, the process of learning and the collecting of significant data.

In the meantime, he had a press secretary who sent newsletters to countries all through the orient. I would have thought that there was not enough time to, but by

Saturday replies had already come from India. Probably a major goal from Fuller's standpoint was to see if untrained people could put up a dome without ever leaving the ground, without using any tools. Further, he knew that the material he had in mind (bamboo) would work--but he was making a demonstration. He was aware of the huge shelter problem in India and aware also of the highly developed plastic technology there. Bamboo and plastic technologies could be made to resolve shelter problems. Further still, aerial deposition of this kind of shelter could be developed. So he had a collection of goals each of which served the others.

How did he make it possible to call Georgia? I asked him about this. He said, "Well, I charged them a fair amount for the Monday evening lecture and then I took out the amount I regard as my fee. We supported the enterprise with the difference." In the meantime, everyone who took the course paid a certain amount and the lecture in the auditorium was attended by a paying audience. And then he listed all the things he would not put up with. Standing in line, having someone come in and demolish what you have just finished doing in the name of custodial service. (I still ache over something that happened during the depression. The fact that it was 1932 or so doesn't change my ache. At that time, I collected the work of an English illustrator, Edmund Dulac. His material appeared in the Sunday supplement of the Examiner--illustrations of myths, Irish legends, Songs of Solomon. Sunday supplement color graphics have a wonderful texture and this man's work lent itself very well to the medium. In those days, a penny really bought something, so I gave my students a penny a piece for copies of these illustrations. I had them all sorted and cross-hatched. The Songs of Solomon this way, Irish legends that way, myths this way. Then came Easter vacation. The custodian who couldn't imagine why anybody was saving this junk assumed that I had cross-hatched it for fun, so he threw it out. I have a feeling that this kind of thing has happened to all of us, including Mr. Fuller. His position was that if we wished to phone, we should phone; if we wished to eat, we should eat; if we wished coffee, we should have coffee; if we wished a parking place, we should have it. If we wished to go away and leave our work, we should find it where we had left it when we returned. If we needed money, we should have it. Everyone of the things he was talking about is an example of the kind of triviality that keeps you from doing something major.

Other intriguing facets of the seminar were that no one got college credit; no one laid down any regulations; there were no charts kept; no responsibilities listed. The nearest thing to any documentation of effort or responsibility was the listing of names of committees with the names of the people on each one. It was assumed that the first name on the committee was the chairman. Work went on every day from before 8:00 in the morning until after 10:00 at night.

Afterward, Mr. Fuller gave a little summary. He is a very affectionate man and had to reach out to touch someone before he could go on with his lecture. He had brought his grandchildren to see the dome. We turned all the car lights facing the dome, making the wonderful lattice-shadowed criss-crossing. Someone asked him if he taught his grandchildren words like "Geodesic cone." He said, "Why not? It is no harder than Walter O'Malley." Then he explained the kind of cohesion of this group and how it differed from that of college groups with which he had worked with in the past. College groups, he said, tend to choose up teams and establish loyalties and are more prankish. Our group had an age range from around sixty-five to nineteen or twenty and a professional range that included business, engineering, mathematics, students, teaching, graphic arts--one man actually sold railroad engines for a living. There were two or three people who had known each other or who knew of each other, but it was not a group of common age or common vocations or, like college students, of common geography. Even so, there was a kind of cohesion. Fuller's comment at the end was, "This is the first group I have had that worked with non-frantic cooperation." The point is, then, that in teaching, as in anything else, there are many trivialities that destroy what we are trying to do. Most of them are tied to process, or to organization.

Not long after the bamboo dome, I went to teach for the university, a class (as I said before) in how to do more work easier in less time with more satisfying and lasting results. When the class begins as a kind of a joke I say, "There is absolutely nothing you can do to please me. Don't waste your time trying to; it can't be done." You would be surprised what relief this little dictum brings. Students say, "What kind of requirements do you have?" "I have no requirements." "Well, how much work do you expect?" "I don't know what you need, so I don't really know what to expect of you." "How do we know what to do." "Give yourself a little time and you will figure out what to do." You might think that such an attitude would drive students away. You might think that it would get all the deadbeats and the snap-course followers, and the candidates for Phd. in Education. The fact is that my course fortunately, doesn't need any requirements for anything. There is really no point in taking it. And that is its greatest charm.

Sometimes it meets in the summertime and when it does, I pretend that I am Buckminister Fuller. I am not built for it, but I pretend it anyway. First, we find a suitable room. The one I like the best is an unbelievable home economics multi-purpose laboratory. It is all rooms to all people. It has a cooking center. You can sew. You can just sit in the lounge. It has its own bathroom. It has an infinite amount of storage. And all of this is one giant family-home economics room. Naturally, the home economics teacher doesn't trust us and has removed everything from the cupboards. That is exactly as it should be. Everyone stakes out a claim. Each day everyone goes back to the place that was his the day before--and all his stuff there waiting.

My class presumably begins at nine o'clock and ends at about four o'clock. I go out for lunch. Students are afraid to go out. If they went out, they might miss the use of the equipment. So they shuffle back and forth and have someone bring them a sandwich. No matter how early I get there someone is already there. People can't live without pressure, you know, so they put on their own pressures. By the third day they have quit asking me, "Is this what you want? What are your requirements? How can I get an A?" They set goals--volumes that they have to accomplish, ideas that they plan to develop They can't possibly complete all they envision. When the class is over, they feel briefly like total failures, because of course, they have set for themselves this totally unrealistic stint which they couldn't possibly have completed in ten nine-hour days. So since they didn't do all that they couldn't possibly have done, they feel that they didn't do enough.

We have a dry mounting press which any lame brain can use, a spiral binder which makes people look bright, a corner-rounder which protects elementary teachers from the fact that they drop things, and you won't believe it, a tool that punches holes in the wings of chickens--makes a beautiful little, compressed hole and is great for materials that are going to be used over and over again and which show damage from pin holes.

Now, gaining proficiency in the use of tools is not what the course is about, but is something to give people something to do while they are thinking and talking, so they don't feel ashamed of not being useful. When I first started this course, I didn't realize that. A young lady is jamming the corner-rounder--you can't believe what an enthusiastic elementary teacher can do to a corner-rounder--and is telling what has been going on at her school, how she feels about it, and her solution to the problem. She punctuates with the corner-rounder. My corner-rounder looks like one of those displays that automobile body repair people have--a beat up old car that has run through two speedometers and an accident--but still goes. At the end of every quarter someone has to overhaul it--the someone that has to is my sister-in-law, who is both mechanical and manual. We had a little discussion at the beginning of the hour here about the difference between being mechanical and manual. To be mechanical doesn't mean that you can fix the car, it means you know what is wrong with it. My sister-in-law not only knows what the trouble is without having been told, she knows how to fix it and as every class ends she repairs up my tools so we start over again.

If you ask the students what they were doing in this class, by and large, they would tell you they were working on their "collections." They have picture collections, magazine extractions and such. Sometimes they work on vocabulary building collections. Apropos of vocabulary building, I have a wonderful little article about the man who was trying to reduce his vocabulary. He thought he didn't need words like "the little woman," "the ball and chain," and "the mill stone." He could just say "my wife." But elementary teachers are always having to build the vocabulary. (I'm inclined to believe that this activity discourages children's own natural tendencies to build up the vocabulary.) Anyway, the point that I hope to have made here is teaching the merger of content and graphic materials (e.g., "collections") is a goal of my class.

May I make a digression again? Some years ago someone called my husband and said, "My son has to take the college boards and I was told that your son did quite well on the college boards." (You know, talking to my husband on the telephone is a thing of wonder. You talk, and then you wait and wait and then you say, "Are you still there?" He says, "Yes.") Finally he said, "Perhaps my wife can help you." That didn't mean he couldn't help--it meant he wasn't going to. So this person wanted one of us to help his boy learn enough to get a good score on the college board. Ridiculous! I gave him the usual pitch--"Why don't you send him to the junior college, it is better anyway." "I know, but everyone else is going to the college of his choice and anybody knows that the junior college isn't the college of his choice." "Well, the college of your choice is really the college you can get into. And as soon as you face that--." Children face that a lot sooner than adults face it; but then adults have got over being smart. Ultimately, the boy came to work with me. He was recalcitrant and muley and would have preferred surfing. To the next parents who called I said, "Have your son call me. If he wants to call me, he and I will talk about it--if he doesn't call me, that's it." So the son called me and said, "Everybody else is going someplace else, but if I can't get past the college boards, I can't go." I said, "If you can find three other guys that feel the same way, we will talk about it." So he rounded up three other fellows and then I thought I was very smart. I said, "All right now, I am expensive. It costs lots of money to come to my class and I can be late, but if you are late, don't ever come back. And if you are absent, don't call me--and I won't call you." So I charged what I thought was a huge amount of money, you see I am talking in school teacher terms. (We live in a community that relies on school teachers, but is not a school teacher community.) Five boys showed up. They had this tremendous fee in their pockets and they were extremely courteous. I mean money made them courteous. We sat down and I said, "Now, you know a great deal more than you believe you know." They agreed to that. "And we have certain rules in here." (I repeated my rules, because this is standard school teacher practice; we repeat.) "Don't be late, don't bother to come if you are late. If you are absent, I will assume that you have resigned. The next rule is not to take anyone else's turn. He has a right to his turn. Don't take anyone else's turn and don't treat anyone else's answer lightly. What anyone says in here is valuable. We are not concerned with his answer. We are concerned with how he got it." This was the first of many such classes. I don't know how much the students learned, but I learned a tremendous amount.

They did know a great deal more than they thought they did. They had lost their spontaneity. Because they were seventeen or eighteen, they were afraid of appearing to be fools or different. They had been taught so many things in compartmentalized ways that they didn't understand that everything they had learned was really another look at something they already knew. For example, we would take a word. They really loved the word--"misogynist." The first time, I chose the word deliberately because the father of one of them was a gynecologist. And I knew that he knew what his father treated. And they also knew what a misanthropist was. They had had that word. They knew about anthropology. I knew that they could work out "misogynist." It just suited them fine, they had had enough of women teachers and it was a big word they could use immediately elsewhere.

Well, the rule never to laugh at other people's answers brought out so many exciting kinds of truth. I will tell you one only. One boy was asked to tell us which word belonged in the blank. The sentence read, "The doctor was annoyed with the______for using time needed for patients who were really ill." The choices were misogynist, hypochondriac, dipsomaniac, kleptomaniac, and psychiatrist. The kid chose psychiatrist. I said that that was not the answer I would have chosen but I would like to know how he got it. He said, "Well, a misogynist that hates women doesn't need a doctor. A kleptomaniac takes things and he needs help, but not medical help. A dipsomaniac is a drunk, he needs Alcholics Anonymous; a hypochondriac may not be sick, but he needs help from a doctor just the same. But a psychiatrist should know better." A logical wrong answer is basically superior to the accidental "correct" answer.

To go back to Fuller, it is important to eliminate those things that really don't teach and those elements of the process which have become more important than the outcome. Among such eliminations are the ordinary daily annoyances that living in an organized society produces. Parking, standing in line, trying to telephone, bells. Additional eliminations should include those things which humiliate or prevent the release of information that would be valuable, that prevent the sharing of attitudes that need to be looked at. We live in a society that makes such a demand for conformity that to be different is a sin.

Yet all progress was made on the basis of difference.

And finally, the question is infinitely more important than the answer. Answers really create new questions. Solutions create new problems. We used to use a sentence to open the one section of the Art and Civilization class, the section on three dimensional industrial design. The sentence: "'Invention is the mother of necessity.' Please write a half-page discussing this. No questions, please. Just write." The students were all itching and twitching. Finally someone who didn't care what you think blurts out, "Don't you have it backwards." And, of course, he was mistaken. Invention is the mother of necessity. Once you have the automobile you need gas, tires, repairs, insurance, freeways, two-car garages, all kind of service, car laundry, an endless collection of necessities because the car was invented. (A loose but popular use of the word invention.) We really didn't particularly need the automobile when it was invented. The automobile was preceded by not very many years by the bicycle. (We are in the hundredth year of the bicycle. I keep thinking that some magazines like Look or Life are going to notice this fact and do a fantastic issue of the hundredth year of the bicycle but no one else has paid any attention to it.) At any rate, the bicycle paths, as you know, made possible the first use of automobiles which initially rode around on bicycle tires.

We tend to step on our own feet; we tend to substitute process for outcome. We tend to make decisions as to whether something can be done, rather than whether it ought to be done. And we tend to take ourselves infinitely too seriously. A book I suggest to you is Bury's Idea of Progress. You will hate me for suggesting the book because you can put it down. It is paperback for which I am glad because I believe perhaps now he will get a few royalties, although I can't imagine it ever being a best seller. The Idea of Progress is essentially a literary history explaining the antecedents of the development of the notion of evolution, but Bury is so sneaky about spinning out the idea that you don't notice what he is talking about. By the time you get to the nineteenth century, it is really exciting. Here, Bury points out a most interesting thing about the history of mankind: We began with such a noble description of ourselves and our world, the universe. Top dog is mankind, the image of his creator, better then anyone else and possessed of noble ancestry. Then someone began to suspect that the world wasn't the universe and that man's ancestry wasn't so all-fired hot and that perhaps man is not in the image of his creator. Each one of of these denigrating suspicions we have wiped off by saying, "Oh, well, we are changing all that." The important world is the world I can see. The important life is the life I am living now. The important things are the things that I know about. But then, regrettably there are people who keep on finding out more and more until finally what most of us know about mathematics alone amounts to an inch on a mile-high column of what is known. Knowledge of time and the universe is so expanded that if you give yourself any more space in them than a grain of sand, you are a little presumptuous. Well, it is hard to allocate any significance or importance to what you are doing in the shadow of that kind of scale.

I would like to stop here by saying that I believe the one thing the very young have over anyone near my age is that they are aware of all this immensity and are not nearly as depressed about it as I am. They grew up amid the infinite, whereas I had it thrust on me. I still can't quite believe it. They grew up dodging the bombardment of communications. They grew up when change had already accelerated. So if time is so short, and the scale is so vast, it seems to me that if what we do in terms of comparison seems not terribly important, then it ought to be at least as clean and efficent and integrated as possible.

I brought my homework today, some things I would like you to look at. (1) McLuhan's book The Mechanical Bride--easy reading and full of pictures. (2) Fuller's Nine Chains to the Moon, a fantastic time line in the back (I got it in Aspen in a Thrift Shop for fifteen cents). (3) 1984, Pelican Publications of a set of articles commissioned by a scientific organization in England, the foresights of eminent scientists for 1984. I am indebted to John Neuhart for them. (4) Understanding Media. (5) Burlingame's Machines that Built America, a really great little book that I think has gone unnoticed. It comes in paperback. (6) Call Me by My Right Number, Please, an article from "Saturday Review." I love the tag line. The author was trying to get herself identified to at least two professors so she could get a job at summer camp. She had a long name like Manuella Maria Theresa Sabatini which wouldn't go on the machine--so there wasn't a professor anywhere in the place who would have any idea of what her name was. Finally, she gave her telephone number to someone from another country. She said, "My number is Capital 792038." He said, "Pardon me, but how do you make a capital 7?" (7) Man Made America, a very valuable lonely copy. If you look at it you will see that it is marked "loan copy, property of the architects of England" and so forth all scratched out. Paul Riley who is the director of the Design Centre in Haymarket in London sent it to me and I am positive that he got it just the way you think he got it. He crossed everything out and he sent it to me, and I especially like it because he thought I needed it more than they did. (8) Design Decade, a ten year summary of the design of the 1930's put out by Architectural Forum. If anyone here is the editor of the Architectural Forum, I will take this back, but I honestly believe the editors have rested on their laurels ever since. They have never had an issue that equaled October 1940. The chances are that some junk store has a copy and doesn't know its value. (9) California Design 8, don't regard this as something remarkable, but I bring it to you because of summaries like it. They don't take up much room and are pretty good as overviews. California Design 8 was the catalog for the show that comes every three years in Pasadena. Number 8 contains a marvelous little car called the Desert Rat, designed by a Cal Tech graduate and having big soft tires like the airplanes that set down in Alaska. The Goodyear people are making the tires for it. I think I have the designer persuaded to have "desert rat" cast backwards in the tread so that as the tires leave their impressions in the country road, all who see them will know who has been there. (10) Harper's Centennial Issue. Great! (12) A little magazine called Landscape. I commend it to you. (13) Andreas Feininger's Anatomy of Nature--a fantastically beautiful wedding of type and content and photography. I don't know which is the bridesmaid. (14) "Architectural Forum" issue of Frank Lloyd Wright, November 1938.

## LECTURE 3

In essence, I was trying to say that you should be lazy. You very nearly have to be because there is so very much work to do that if you weren't lazy you would work yourself to death. One way to cut through the morass of things that harass you, bug you, and confuse is to rely on the tendency of periodicals to come out with surveys, overviews, and monographs. Publishers don't call them any of these things but that is what I believe they are. The samples I brought I picked up at random from those I had on hand. Probably many of you have the same or better ones. There were two on Frank Lloyd Wright and one on the "Nineteen-thirties" which was an overview of the shift in the character of industrial design at a time when consumer resistance was high. Design has taken such leaps since then that it is a good thing to go back to see what was happening in that decade--it is actually calming. *Man-Made America* and *Machine-Made America* were *Architectural Review* surveys--the English magazine--critical and a little bit painful. *Harper's Centennial Issue* took the editors several years to prepare and meant going back, re-reading their own stuff. The most enlightening thing you can do is to re-read your own stuff; you find out some things you used to believe and some you forgot ever knowing. As for *Harper's*, they found out, I believe, that they had been reasonably sound much of the time. The most entertaining thing I found in the centennial issue was that Mark Twain had been alarmed by what was going on in Europe in the first decade of the twentieth century and actually put his finger on the man from whom Hitler took the reins. He paralled this circumstance with what had been happening in his native state. It is interesting that *Harper's* happened on this observation; they suggest in their report of it that the man's name was never mentioned in any other English or American publication. If you wish to read something really dramatic and exciting, read the *Harper's Centennial Issue*. Next is the *Scientific American* spectacular issue on "cities." (You can never go wrong with *Scientific American*, but of course, if you want to go wrong, don't read it.) The *New Republic's Fortieth Anniversary* issue is a little staid and exemplary, but is the same sort of effort as *Harper's* centennial. The *House Beautiful* issue on Frank Lloyd Wright is worth your while. *New Republic's* 50th Anniversary looks forward, titled "America Tomorrow" and has some pertinent comments on the Great Society. Then there is a quarterly called *Landscape*; and every issue of this critical review seems to me to be useful. I think the same is almost true of the *Design Quarterly*, but some of the *very* old issues of the Quarterly (which can still be had for one dollar by writing to the editor at 1710 Lyndale, Minneapolis) are very worthwhile. One in particular is the story of the knife, fork, and spoon; if you don't know it, for one dollar you can find out what knife, fork, and spoon have been through these many years. And then UNESCO *Courier's* issue on the "Art of Writing." They don't mean writing sentences; they mean putting down ideas on a surface! With pen, brush, scribe, or stylus. It is their fantastic survey issue. UNESCO *Courier* has also an issue on oceanography which came out in connection with the Geophysical Year. It is unbelievably beautiful and cannot be had from UNESCO--out of print about three weeks from the day it came out. You might live in a town that has a second-hand magazine store with a copy.

I am not listing materials that seem important to me, but materials that seem important to me at this moment. One is Fuller's *Nine Chains to the Moon*, which I like for two reasons. It has the most wonderful description of a man, "an adaptor base biped, mobile on land, on sea, and in the air." On land, in the water, and in the air! Then he begins to list in mechanical terms all the faculties that make man adaptable--able to function. He has also a Time-Line, not one on the war or other erosions or what triggered World War I. Instead, it tells when the sewer systems were first devised, when was the first diving bell, navigational instruments, the kinds of things upon which civilization stands. He's droll, too; he included the date his fraternity was founded. I don't know what he thinks that has to do with civilization, but I am willing to let it go. Machines that Built America I commend because you can read it from ages eight to eighty--Burlingame doesn't distinquish between the child and the adult. To me this kind of blindness is the ultimate. My sons who are in the political science, feel that this book makes too many assumptions and that it lays importance to things that an economist would discount. I throw this view in because you can't always rely on the people who advise you about what to read. In spite of their youth and superior education, I still believe it is the greatest book and continue to give it to people for Christmas. The Anatomy of Nature I commend to you because there is within it a very beautiful wedding of text and photographic materials. It is true that they have fantastic texture or an exciting presentation of what it is like to be a spider and be subject to people stepping on you, but there is a content made from text and picture--but a single content--that is worth observing. Our World from the Air by E. A. Gutkind I like for a variety of reasons--one is Gutkind's combination of humility and profundity. Gutkind presents the environment that man came to, the circumstances that caused him to do what he has done to it, and the routes he has gone through to get to where he is now. The book is the purest example of a marriage on content and graphics. In this case, I am saying that the pictorial material and the verbal material are both content, even to the extent of keying pagination with geographic positions. (i.e., each page has a picture of a place in the world. The end-sheet world map carries the page numbers in the appropriate geographic positions.) La Plus Vieille Histoire du Monde I brought partly because it is charming and partly because I think the presentation matches the innocence of the time. It is a cloth book in French presumably for children, it cannot be discussed--must be seen. The Mechanical Bride, an early book of McLuhan, you will enjoy because it seems as though you can understand it. Now that I have tried to read later things of McLuhan, I am not sure that I did understand it. If you have the Harper's review on McLuhan you feel a little better. Siegfried Giedion's Space, Time and Architecture and Mechanizations of Command are essentials and certainly don't need my recommendation. When our copy of Mechanization was new, we had just moved into a brand new house. The book was right beside the fireplace. The new house leaked and only one book got wet. Naturally it was Mechanization. Two small books which again seem so simple that I hesitate to commend them to you: (I don't mind being simple, but I hate to be recognized as being simple.) Weigh the Word and Consider your Words. I have been insisting on the marriage of text and graphics. I really do feel that the medium is the message, and when they are separated you are in trouble. Weigh the Word and Consider your Words have no particular graphic distinction, but what they have to say and the comfortable way they say it is worthwhile--and they are not graphically offensive.

Incidentally, I loathe putting people in the position of having to read something because it is required and then fill out the eight by whatever size card to prove that they did. I believe instead, that if things are set out for people to read and not made to fulfill requirements, they do read. As a demonstration, some years ago I had a class at Long Beach State College. In about a week and a half, I realized that unlike the students I had known before, my new students wished to read but just had not done so. So we made a circulating library. The arithmetic needed to keep books flowing was almost beyond me. The "library" contained as many titles as students, each title being given a number. As there were only fifteen reading weeks left, no one had an arranged opportunity to read more than fifteen "titles." On Wednesday, 'A' passed his book (or monograph or magazine article) to 'B' and so on, the last fellow giving his to the first one. Circulation was deliberately set for the middle of the week. Some would have a book that took a long time to read. Others would have a very simple thing like the Vogue Magazine issue on the uniforms of the working people of America. (If you haven't seen it, it is a very deserving issue.) The effect that the system had on the student was to give the feeling that he had only a week to concentrate. Midweek exchange set up a natural conversational exchange--no submitted evidence of reading was required, but evidence emerged just the same.

The 1984 books suggest what things could be like when this year's babies are just out of high school. I didn't bring Ritchie Calder's book After the Seventh Day, but it too is worth your student's while. The Idea of Progress by Bury is painful and important. The chapter on the years of and after the French Revolution and Darwin's earth shaking pronouncement are especially important. It is now a paperback. A companion to The Idea of Progress is Primitivism and the Idea of Progress--a book that summarises one area of man's ability to believe in both of two incompatible "truths." We believe in the size and complexity of the universe, but we still accept the earth as its hub. Designers of the nineteenth century believed in the "noble savage" and the corruptive force of civilization, but also in ancestry, high birth, cultivation and gentility. It almost has to be one, the other, or neither. We are forever trapped by our ability to believe two things, both of which couldn't be, while one or the other only "might" be.

I save catalogs of exhibits. The catalog I happened to bring is California Design 8, which may actually look better than the exhibit did as many of the photographs were taken about three days after a lovely spring rain in a sycamore grove in California where anything would look great. The brilliant pale green, the spotted tree-trunks and the work of people like Jean Ray Laury, Jerry Johnson, Hendrik Van Keppel and Truman Ziegenfuss. Their work would look good anywhere, but in combination with a meadow in spring in the Arroyo Seco it is great! So catalogs you should save. The Thonet exhibit at UCLA came out with a very handsome comprehensive catalog. Walker Art Center's Quarterly is occasionally in the form of a catalog. I suggest to you that thoughtful catalogs have special merit and may give unique coverage. Save them.

There is so much advertising that we no longer believe advertising. Children are the greatest sophisticates in the area. When mine were small, they used to sing a song called "Super Suds, Super Suds, does the dishes, feeds the fishes and besides it tastes delicious." When they were in kindergarten they didn't believe any of the super suds promotion. Today no one has ever heard of super suds; we are off to something else. Suds no longer are in style and besides they complicate sewage problems and meringue the streams. As a concession to Rachel Carson, we have stripped suds of respectability and power. Whiter and brighter than whatever are now the vogue. In connection with this subject, all the way through the mountain-pass enroute to Seattle, everything I saw reminded me either of Salem cigarettes or the beer that is better because of the water or a wash that is brighter and whiter. It took me a while to get past these associations and just see this fantastic scenic change. As a non-smoker, I am indifferent to the cool clean mountain freshness of cigarettes. As an informed consumer I mistrust the spurious and transient phosphoric whiteness left on "clean" linens by "low-sudsy" detergents. The beauty of the Northwest is immune to the advertiser's ritual, but we are not. However, we ultimately tune it out, just as a child no longer hears his repetitive mother--but the effort of senseless repetition is eroding just the same. The problem is scarification and erasure. I don't know how to do it. I suggest that time does erase, but does so only impartially. I used to ask my students to play a game with me about all the advantages the rich have. We finally concluded that the main thing the rich had that we don't have was that they got there sooner and saw the lousey movie because they could afford it in its first run. As a consequence, they didn't find out it was lousey from someone else's observation; they had to find it out for themselves. If they were stuck on the freeway in their Cadillacs, they were stuck just as much as we were in our Volkswagons. If they went to swim at the beach, a private beach, the sand was the same temperature as the sand at the public beach and the sea was just as salty as at the public beach. It is true that they had lots more pairs of shoes or suits of clothes, but you can only wear so much at one time. There isn't really as much to be said for this plethora even in personal terms, that our struggle for more and more goods and services sometimes lead us to believe. I don't mean that I would't like to be rich, I would like to see if there isn't some way of getting around the problems the rich have. As a society, we have forgotten that "being poor," as we know poverty today, was the condition of the rich not long ago. Whom do you know personally who is denied running water (hot or cold), electricity, indoor plumbing, telephone, radio, television, etc.; Cornelius Vanderlip had none of these.

Some years ago a publisher's representative came to the school I taught and asked if we wanted sample copies of the new textbook on art. I take sample of anything, Watchtower, anything. So I said, "Yes, I would like some but what you really need though is a better textbook." He said, "Why don't you send me a manuscript." (He, of course, had nothing to do with anything, so he was free to say that.) Then he said, "What kind of a textbook do you have in mind?" I was ready for him. I would like one that showed how people eat, sleep, work, play, congregate and communicate. How do the circumstances of civilization, time and place modify these activities. How does technological change modify craftsmanship and, more important, consumership. I would like to see some kind of a time-line devised which is color-coded and which is cross-hatched, which puts things in their chronological, geographical, technological pigeon holes, but doesn't isolate them from the flow of civilization. Then I would like to get people who knew what they were talking about to produce a collection of monographs. Let's say Carl With, who taught at UCLA for some years, and talked about the gerunds of living. At the time the publisher's representative called, I was all worked up over the gerunds of living. We had started to collect ways that people sleep. In short order, we discovered that comfort is not an absolute, but dependent on circumstance. If you were in Alaska in freezing weather, a bed of hot rocks was comfortable, but if you were in Haiti sharing the problems that they have in Haiti, a hammock is pretty comfortable. If you were the wife of the Governor General of a crown colony, a bed would be an entirely different thing. Comfort would be ritualistic--accented with pillows, fringe, carved wood and a lot of externals. And so at that time we were all steamed up over the idea of a monograph on the gerunds of living.

The range of subjects for monographs is infinite. At the time we had masks high on our priority list--Kenneth McGowan was then on the staff at UCLA. He had a unique world-wide collection of masks. (As far as I know, all cultures have used masks, there isn't a natural material that hasn't been used in masks.) Instead of masks being included as part of a history of civilization, masks would be presented in a monograph--keyed to a time-line.

Now then, take these two topics: The gerunds of living and masks. We are saying that here is a map of time with a geographical spread and cultural overlay. If Kenneth McGowan discusses or shows a Seneca mask or a Benin mask, we can spot it by time and place and culture by means of a cross-reference like that used on road maps. All visual materials supporting McGowan's monograph would be keyed into the time-line. So we could say, for example, this mask was produced in the eighteenth century in a certain section of Africa and was made of wood by the Benins.

I suggest not that this is the way to do it, but that it is a kind of approach, a theme, generalization, a way of keeping things together separately or keeping them separate but together. I wish students of civilization could find a way to avoid burying people under an avalanche of time, burying ideas and concepts under an avalanche of time. At any rate, I didn't write the book and if I had tried to do so I doubt that I could have got McGowan or Altman or Calder or Rapoport with any of the people who could have done the monographs to do them.

In the meantime, as Rapoport says, there is no idea whose paternity can be traced. The idea of a really good time-line has been developed a number of times in a number of different ways. So far, no completely successful one has come out but there is an approach. Now it seems to me that Bellingham is the place where a time-line ought to be thought about. The graphic people, particularly graphics people who are aware that an explosion is going on in the communications world, and others whose business communications have a responsibility to fields other than their own. Physicists really ought to have the help of the graphics people. Heaven knows, graphics people need the help of the physicists, but it is the other way, too. All of the sciences--any of the concepts and information fields--have been short-changed by the graphics field over the years. And I don't really believe that is true, I'll restate it. They haven't made use of what graphics could have done for them.

Now here is a group of people who are concerned about keeping up with the climb in technology and rate of change and have actually put their fingers on the problems we face. And one of these problems is to do a better, more efficient communications job of the field which have in the past depended almost entirely on words. A list of people who have attempted to do so would include such names as Charles Eames, John Neuhart and Will Burtin. An example--not entirely successful--is Mathematica--up in Chicago and Los Angeles. It is a room in the science building in Los Angeles, it has been up a number of years now, paid for by a grant from IBM. The exhibit includes series of three-dimensional mathematical demonstrations:

Probability, topology, homostasis, etc. Among them were projection booths for the use of a single viewer. These are all gone now--couldn't be kept working. This is a problem with which the design world has to cope. What works very well in the studio doesn't work for the general public. Automobiles or washing machines work until on the highway or in the home. There were great little movies that you could put on, literally. You got inside the booth which showed you exactly what topology was. If you didn't get the message, you could press a button and go back and then go forward again. We are in the habit of kicking the television, banging on the coke bottle machine, jumping up and down in front of the porch light. The machines couldn't stand up to public difference, so the gallery now has an image that a group of people look at at a time, controlled remotely, without playback. Something great is lost.

There is another limitation--I would protest this time-line because it has too much of a certain kind of copy that I call parochial biography. I don't really believe that mathematicians can count to two million when they are two years old, but mathematicians believe this. So the biographies of mathematicians on this board are full of the kind of information we have about George Washington telling the truth and cutting down cherry trees and things like that. It is diverting, but not illuminating.

Last year the American Physicists had a grant to come into Seattle to try to do something about up-grading the rate of efficiency of teaching physics in high school and in college. There was a six-week session in Seattle which involved film-makers, copyrighters, physicists, teachers, the research people. They ended up very, very, disappointed because they didn't move the mountain and couldn't really see that they got any results. On a grand scale, it is like Lustig in 1936--they don't even have a Christmas card to show for it. Two of the people on the staff were Ralph Caplan and John Neuhart. Two things came out of the conference: Controversy and conflict among the participants which is probably the best thing that happened. Further, I believe there emerged an awareness--there should be books which use graphics as one of the tools for teaching physicists--and that the more difficult the concept the more the reason for telling it simply, for not getting in your own way.

Years ago I wanted to send a magazine article to Industrial Design and at that time the editor was Jane McCulloch. I went up to her in Aspen and said, "I hate to bother you, but if you are not too busy I can take up a little of your time---." I kept on going and going and going. Finally, Mrs. McCulloch said, "Quit apologizing and say what you have to say." So I said, "I have an article I would like to send to your magazine." She said to send it so she could see whether it was something she could use. So I waited--apologizing to myself for a year and then sent it. The article was on the history of boys socks, or the influence of an exchange of communications between producer and consumer.

When we moved to the country we had small boys to whom someone had given a wishing book, i.e., a mail-order catalog. And so our kids immediately opened it up and started ordering--ropes, saddles, tools, whatever. But I noticed that it had children's socks, T-shirts, and underwear and sweaters. So I began really ordering. Socks would arrive and the next thing you knew they were faded or they would have holes in them and they would be worn out. Or one would be lost. I would put the good one in the mending basket, thinking surely we will find the other in the course of time. (About this time, automatic washing machines came out. The washing machine promoter tells you you can wash your husband's levis that he used to fix the car and towels that he wiped his hands on and the children's socks, and the dish towels all at one time. You put them all in there; they go around and around and come out brand new and folded. Of course, after twenty years this still is not true.) At any rate, the socks would fade; they would still be good, but they were faded. The kids would say, "Those are not my socks; those are yours!" No one wanted to wear the faded socks; I longed for the catalog to come out with fast color socks. The next time the catalog came there were fast color socks. Then, of course, socks were perfectly good, but they had holes in them. You see the criterion for "perfectly good" shifts. As soon as they had holes in them but weren't faded, they were perfectly good with holes. I wished the manufacturer would reinforce the place that wore out. You won't believe it, but the next time the catalog came out there were socks that were reinforced at the point where they wore out. So we got that done. Of course, it was obviously a man who redesigned the socks because the reinforcement came right to the point at which the heel rubs on the sock, so wore out anyhow. So I said, "Well, I certainly wish they would make them so that the reinforcement extended above the heel." Well, of course, if you are a woman you believe no one who pays any attention; not so! They did extend the reinforcement. So then here were perfectly good socks that had no holes in them and were not faded but were too small. Of course, the boys had grown in the meantime. Too bad they couldn't make socks that keep on fitting. And so they did. Then it seemed a shame to me that socks couldn't be made to match the T-shirts and so they did. Everytime I had some idea the catalog would come out with it in the next issue.

Well, you know why. Everyone else sat down and wrote, saying, "What do you mean by selling me socks that don't fade but do wear out or socks that don't continue to fit my child who was now twelve and so forth. I didn't write them the letter but many people did. So there was an exchange between consumer and producer. Mail-order is the only commercial-industrial situation I know of where there is this direct exchange. In addition, the catalog carried other design catagories like washing machines, and dryers, that were going through a technological change at the same time. The technological change in these machines was influencing the character of the socks.

Now the sock is a peculiar thing. If you were riding on a donkey in the Pyrenees while knitting a sock it would be the same kind of a sock that comes out of the Sears catalog only, except for the distinction of being handmade. The technique, the principle, the number of stitches to the inch, the denier, all that are essentially the same. The sock is what is called a "pure item." Any changes that are made in it can be made in readjusting, reprogramming the tool rather than redesigning the tool.

Now then, I have a problem: My husband doesn't believe in throwing anything away. I say, "Why are we keeping this catalog, it is for 1948 and we are already up to 1951." "Well--I kind of like to look back in it," he says. So you won't believe this--I have a complete collection of Sears catalogs, from 1948 to 1966; we are probably going to have to rent a garage or move. But, if there is anything you want to know about the change in the character of design, a catalog is a fantastic place to get it--and interrelations! Furthermore, in a peculiar way, the catalog predates over-the-counter stuff. If you buy socks over the counter and later find that they are not fast color, when you challenge the sales person, she doesn't recall saying they were fast color, but the catalog can't help recalling saying they were fast color. You can check back in the catalog.

Now then, an overview is where you happen to look for it--overview in magazines or overview in catalogs. Selective overview is a good, healthy pursuit, and inexpensive too. Catalogs don't cost anything as long as you buy something.

Everytime I want to tell something that seems terribly, terribly important to me, I have this awful fear that other people won't believe it is important. I also have the feeling, which is an ugly kind of ego, that maybe it won't come across. I sent the article off to Industrial Design. About three weeks later I got a letter that said, "Who are you?" The article was in print within a month after it left my desk. And I had wasted a year trying to figure out how to write a covering letter that would convince Industrial Design to buy the article. This is a lesson which I have not yet learned but which I believe I could teach to other people, particularly students: Don't garble the message by trying to make it interesting or convincing or trying to give it external impact. Information is interesting. What you want to do is not get in the way of it. It doesn't need to be ornamented. It is like a friend of mine who teaches second grade. She goes down to Cabrillo Beach, buys something that looks like sand to me and takes it to her children who put water in it. The next thing you know, grunions hatch out, get going, and swim around so fast you can't believe it. The fish catch the children! There it is, a miracle that doesn't need any embroidery at all. You don't have to make it interesting; you don't have to put scallops all around the edge or anything else. The pitch is don't do as I do, but rather as I say.

I feel so indebted to Dr. Rapoport because of something that I knew before, but out of a kind of vanity didn't want to believe. And that is that no one can trace the paternity of an idea and no one has an idea by himself. If you talk to any person who has talked to other people from a platform, he will tell you that almost every time someone comes up and says, "You know, I've been thinking about what you were talking about. In fact, I saw a book on it in 1914--would you like to borrow it?" And today when I spoke of my time-line I discovered at least a half dozen people in this room have been working on time-lines for years. We should pool our ideas and our resources on this. I would like to read to you about the greatest time-line ever--Fuller's. I wanted to distribute Fuller's time-line to my students, so I wrote to him and told him. He replied in handwriting, "Fine, use it for your students and your students only, but don't sell it. You may give it to them, you may not sell it to them, and it may not be reproduced for selling." Now, five years later, the book (Nine Chains to the Moon) is in paperback and I am free of the task of reproducing the time-line for my students.

I would like to read a page or two directly from "Nine Chains to the Moon"--Fuller asks, "What's a man?" and replies, "Man? A self-balancing, 28-jointed adapter-base biped; and electro-chemical reduction-plant, integral with segregated stowages of special energy extracts in storage batteries, for subsequent actuation of thousands of hydraulic and pneumatic pumps, with motors attached; 62,000 miles of capillaries; millions of warning signal, railroad and conveyor systems; crushers and cranes (of which the arms are magnificient 23-jointed affairs with self-surfacing and lubricating systems, and a universally distributed telephone system needing no service for seventy years if well managed; the whole extraordinarily complex mechanism guided with exquisite precision from a turret in which are located telescopic and microscopic self-registering and recording range finders, a spectroscope, et cetera, the turret control being closely allied with an air-conditioning intake-and-exhaust, and a main fuel intake.

Within the few cubic inches housing the turret mechanisms, there is room, also, for two sound-wave and sound-direction-finder recording diaphragms, a filing and instant reference system, and an expertly devised analytical laboratory large enough not only to contain minute records of every last and continual event of up to seventy years' experience, or more, but to extend, by computation and abstract fabrication, this experience with relative accuracy into all corners of the observed universe. There is, also, a forecasting and tactical plotting department for the reduction of future possibilities and probabilities to generally successful specific choice.

Finally, the whole structure is not only directly and simply mobile on land and in water, but, indirectly and by exquisite precision of complexity, mobile in air, and even in the intangible, mathematically sensed electrical "world" by means of the extension of the primary integral mechanism to secondary mechanical compositions of its own devising, operable either by a direct mechanical hook-up with the device, or by indirect control through wired or wireless electrical impulses.

"A man," indeed! Dismissed with the appellation "Mr. Jones!"

Common to all such "human" mechanisms--and without which they are imbecile contraptions--is their guidance by a phantom captain.

This phantom captain has neither weight nor sensorial tangibility, as has often been scientifically proven by careful weighing operations at the moment of abandonment of the ship by the phantom captain, i.e., at the instant of "death." He may be likened to the variant of polarity dominance in our bipolar electric world which, when balanced and unit, vanishes as abstract unity I or O. With the phantom captain's departure, the mechanism becomes inoperative and very quickly disintegrates into basic chemical elements." What a powerhouse he describes and how little of it we use!

I have here another time-line whose origin I have no idea of and in this case I am justifiably embarrassed. John Neuhart, who incidentally came from Bellingham, gave me copies of two time-lines that he had worked on with Charles Eames. In the package was this color coded (which I thought I thought of) time-line, crossing the boundaries of the major areas of achievement of civilization and running both horizontally and vertically in a fantastic use of the physical properties of color. There is not one sign on it anywhere as to where it came from or who did it. Now, of course, I am always insisting that it is not important who shot John. It is how did it happen that he shot John and what happened to the widow. That is really important--not who did it. And so I can defend not knowing who made this time-line but I am sorry not to know. It looks to me like a paper out of the Scientific American, but it doesn't seem plausible to me that it would have come from there.

We should think about what we were supposed to be talking about, but once more I am not sure what that was. It says here that today we were going to talk about the elimination of redundancy. Men like Gutenberg, Conde Nast, de Forest, Daguerre, Edison have provided us with the means to use words to hide the absence of meaning, music to keep from listening, and pictures as a substitute for looking. The problem is that the positive and honest use of communications tools requires discipline. You have to be careful or you will hole up in some kind of escape play. As I listened to Mr. Tara's reading of Dr. Max Rafferty's comments on obscenity, I realized that Rafferty was sending two messages. One was the message he said he was sending (I'm not sure he really sent that one). The other message he hopes you will get verges on the subliminal. It is not really subliminal, but I believe he thinks of it as subliminal. Now perhaps he is not a subtle man. We often send messages that we don't intend to send and probably even Rafferty does this. I believe he is saying, "I am a bright man. I am a cultivated man--classically educated! I have two thousand years of culture behind me and a great vocabulary. So you better believe I am right! Now I think this Keinholz is a jerk." Here are Rafferty's exact words: "One of the many things I have trouble understanding is this business of artistic license. Apparently it has come to mean that any squalid, stomach-turning sensationalist is now guaranteed an exhibition for his unsavory wares if only he shouts loudly enough that they constitute an 'honest expression of opinion by a serious artist'....what I have real trouble comprehending is the attitude of several prominent Californian citizens ...." Go through the line and pick out the words that he uses to replace conversational words, references he makes to people you can't quite recall and then the earthy references as "an Athenian sausage dealer in the Age of Pericles" and "Pavlovian reflex." He really isn't redundant, of course. He is sending a very careful, very studied message--destructive, negative, inferential, patronizing and full of traps.

When I first spoke of redundancy, I meant the kind of thing that hits us from all sides, information that can compete with other information in such a way that we have to edit out even though we lack built-in techniques for distinquishing which is the more important. Then there is information that comes to us in a variety of forms and appears to be different information but is really the same information in different guises. This is a problem which pervades the world of education. People learn the same information in several different fields, but because it is in different fields it seems like different information. Example: Our son, who is at Berkely, came home one day and said, "You know what I found out? I am taking the same course five times!" Now there's a great big beautiful lesson. Further, he wasn't complaining that he was taking five different zeroed-in views of a certain range of information, five different personalities looking at concepts which in this case happened to encompass political science, economics, history, and anthropology. Every course was reinforcing another course. Well, that's great, but it isn't always that way. When I think of the vocabularies that we learn separately, just vocabulary--just words that should be learned by root rather than by note or by definition.

I had hoped to show that a time-line can make an economical use of redundancies by establishing interrelations. I am not arguing that redundancy isn't needed at all. Without it you might miss the message. An Eames film had a sentence saying, "The English language is approximately one-half redundant. You can cut that to read--"English is one-half redundant." Even redundant is redundant. The fact that Donder (Blitzen is team mate) and "dundant" and "thunder" are all really the same word would be a big surprise to most children. Then you say, "Well, it isn't very important either." As an anecdote, it is not important, but as a demonstration of something larger it is important. Even allowing for the brain capacity that Fuller points out, that capacity is facing greater and greater taxation all the time--more and more information, broader and broader concepts. Dr. Schwalm read last night, I believe, that if a scientist read all day long as fast as he could (and they read fairly fast), this scientist would in three years be eight to ten years behind. We had better do something about redundancy. The teaching world is the place to start. The graphics world is the place to implement, for the eye does take in the most information, and can edit and re-edit--not that the eye is our only qualified receiver, but it is the one in use, the one for which we have developed sophisticated techniques.

## LECTURE 4

Every day at some point I try to sneak in what I said I was going to say, so that it might seem that I had done that. Today we were supposed to be talking about the development of the responsibilities on the part of the initial purchasers of graphic talent so that its waste and perversion will be reduced, ideally eliminated. Particularly important, here is a re-assessment of the economics of the world of fleeting materials--a world whose moguls hire the talents of the best men available every week and permit the fruits of their labors (and I mean those of the best men, not the moguls) to be carried off to Land-fill No. 1--a euphemism for city dump--the next week. I have been aware of this for a long time--of this situation. (I have spent years trying to teach my children not to use the word "this" unless "this" referred to a specific noun. One can almost not talk without using the word "this" as if it were something.)

Some years ago, our son who worked in the library in town came home with two very important messages. One was--"You know what they are doing? They are throwing away all the extra copies of Life Magazine from the day it was published to 1945. We want them don't we?" The other was, "I told her that if she would just put them down by the fountain that Pedro (his father) would come to get them." Until recently I had tied-up bundles, three months to a bundle, every issue of Life Magazine from its initial publication until the end of World War II. Every copy says, "Property of the Palos Verdes Library. Do not remove." I can't go along with the Land-fill No. 1 solution. Of course, ultimately I couldn't stand up to the problem. We had to build special shelves in our garage to house the kind of thing that I keep--not because I want it, but because it should be saved.

The story of Land-fill No. 1: In our town there was a canyon, very erratic, very ugly, and the result of a dicalite mine. The county owned the property and wished to make it ultimately into a park. That's what they really wanted to do, but right then they needed some place put all the best efforts of Bass, Eames, Bourke-White, Golden, Wolf, Feininger, Tara--every graphics man you can think of--they wanted to bury there. The officials couldn't get the townspeople to go along with the idea because no one wanted to say, "You go straight out Hawthorne until you come to 101. Now, don't stop at 101; go all the way up the hill to a sign saying "City Dump," we live a quarter of a mile beyond that." No one wished to live a quarter of a mile beyond the city dump.

They're very crafty in Los Angeles; the people in charge are crafty--I don't know about the rest. So they changed "Dump" to "Land-fill No. 1." Now you can say, "I live about a mile and a half beyond Land-fill No. 1." You will know it. The hill has trucks at intervals of about a four foot distance between the trucks. (The reason I know it is four feet is that you can't even get a Karman Ghia between these trucks.)

The trucks are going on at a good clip, guided by up-ended yellow megaphones; they turn into a marvelous figure eight driveway. (If I really want to entertain an eleven year old boy, I say, "Come on--let's go to Land-fill No. 1.") A marvelous way to get rid of civilization and do so with the grace of a figure skater. All the trucks are going along like ants in a row, except that ants don't have a rhymthmic turn, they move too slowly to get this nice, lacey pattern. As civilization is dumped in

Land-fill No. 1, along comes a machine to scrape dirt onto it. So civilization is gone inside of a minute and a half from the time it gets to the Land-fill. That isn't all. In order to discourage creatures who might make some secondary use out of civilization, the next man comes along with a spray machine and settles all the dust broadcasting at the same time something that invites animals to leave. If you should come back a week later, you would not recognize the terrain. You don't even have to wait a week. Come back tomorrow. They bury civilization as fast as it can be turned out.

It happens that we have friends who lived adjacent to Land-fill No. 1; they were absolutely enraged. They are very liberal in other respects, but when it came to putting a dump next to their property, they became conservative. Of course, it will ultimately increase the value of their land immeasurably, but as they said with some justice, "We didn't buy our property as an investment. We bought it as a place to live." Well, they were told that inside of ten years it would be a lovely park, where the children could play. The children are all now graduated from college. You see, the children grow up faster than a park does.

Nevertheless, the time schedule that Land-fill No. 1 ran on was so much faster than the projection made by whoever those people are that run the county--that the park and the arboretum are already there and Land-fill No. 1 has had to move over to the other side. Now you give directions by saying, "Go up Crenshaw, etc., etc." The park is there already. Not long ago, I happened to look in the paper and there were the ladies who dedicate things--they had their flowered hats and a whole new fight. The music and theater people wish to have an amphitheater in the arboretum; the arboretum people really don't feel that there is room for music and theater in the arboretum.

So now we have a baroque worry. As a matter of fact, I believe both worries were baroque. A baroque worry is Henry Wolf's term for something that can take a lot of your time, but for which the solution doesn't really matter. The real worry is, of course, what is happening to civilization. I don't really believe civilization is all in Life or Time or Look, but a lot of civilized people work for them and I think this fact deserves your consideration. What to do as a profession about the abuse and misuse of the medium and of the talents that feed the medium.

Oddly enough, talent is an innocent thing and to support this position, I am going back to another anecdote. I once went to Catalina to the ASID conference. I went because it was free and I had never stayed in the St. Catherine, and had a room to myself where I could see all the kitchen quail walk up and down--you should see them, there is nothing like kitchen quail. They know exactly when the cook throws out all these guests didn't eat. They go up and down a fairly steep hill and they waddle--just like women going upstairs. They go down, eat, and go up. They come down about 9:30 and 1:30 and 7:30. They know what to do with civilization, make use of it. Anyway, this was a by-product. There were a lot of people in the field of graphic arts and industrial design talking about professional responsibilities, recruiting new talent, the corporate image. Also, they were quite quarrelsome. "How did we happen to get a room like this?" (Some people don't care to look at kitchen quail.) There were perhaps a half-dozen students there who had a kind of innocent joy you couldn't destroy. They had been given the month to research some kind of a water toy. For fear of taking too long to tell it and tell it inaccurately, I am going to read about two paragraphs out of the report.

"The final event of the conference like the final event of last year's conference was a demonstration of unusual projects--most of them designed by students. Not one of the young person's projects on display and in operation, had need of Mr. Foist's uncomplicated advice. [If you don't know Mr. Foist, Mr. Foist is the man whose digestion I am sure is good. He wakes up feeling great and thinks everybody should try hard. And keep trying and don't be discouraged. I'm convinced that if you have to try, you are going about it the hard way.] All of the young people were pitching; all were disciplined. Moreover, none that I talked with had any delusions of grandeur or notions that they had gone any great distance. Richard Cass, a senior at the University of Southern California had on display a prosthetic device by which a polio victim could use a useless hand. He said to me, "You learn so much about the normal hand from the 'not normal' one." This was a boy who was then twenty years old. I have to interpolate here because I am coming back to Mr. Cass. He had been given an assignment to do some kind of a therapeutic device for somebody and he didn't like it. He liked to make his own choice. So he went over to a place we call Rancho Los Amigos. All the people have left at Rancho Los Amigos is friendship. They either have emphysema or polio or some other god-forsaking thing. He had gone over there and found a little girl about fourteen who had no use of her arms, but had had enough surgery that she could sit erect. She couldn't use her arms, and any available device for secondary use of the arms made her look as though she were equipped for dentistry--full of cables, springs, wires, etc., and then it had to go around on a separate vehicle. Cass was aware immediately that this youngster would like to look as if her arm really worked. He devised a little thing which I am sure is in general use now--a transparent plastic wrist and arm band--which he made into what he called "flesh color" and another band up on the upper part of her arm. To these he clipped a little wire or tube to the underside of her arm running to her neck. By ducking her head slightly, she could activate a $CO_2$ cartridge. Everything was connected to plastic transparent "flesh colored" finger grips. She could hold a ball, a bottle of coca-cola, or a fork. You could see this youngster with her prosthetic device and she hardly knew that it was there. In comparison to the tool it replaced, it was a fantastic achievement by an innocent child who had started from an entirely different level than the professionals.

Since that time, I have come across this young man a number of times. He felt that he was uneducated, although a graduate of the University of Southern California. So he went to U.C.L.A. and by hook or by crook got himself into graduate school. His father was a school principal who said to him, "Richard, why don't you read?" Well, Richard didn't read simply because his father was a school principal I am sure. So after he got going, we talked and I asked him why he didn't write an article that a magazine could use. He said that he hardly knew how to write an article. I suggested that he pretend that I was his mother and that I really had no idea what he had been doing, but would be happy with the result. He should write me a long, chronological account telling what he had been doing and where he had got to. Then it could be put into third person and after that, shot off to a magazine. Well, sometime look it up. The article appeared in Industrial Design. (At that time, Richard was engaged to a girl who cleaned up his English and also ruined the engagement. So never clean up a boy's English.) Now he is at UCLA, doing graduate work in Industrial Design. I will come back to him. I think I have a point here which has to do with responsibility of the profession of teaching, the graphics professions, and the publications industry. I don't care whether publication is visual or some other kind.

Back to the article: "Ed Albright, an Art Center student whose amphibian failed to perform as he intended, replied to my expressions of regret--(you see, I was still sorry about everything, I can't bear distressing situations. I invent the crime and then take the blame. Some people don't need a crime, but I have to work one out.) He said, "Oh, it is just a matter of gear ratios and time. The displacement is good though. It is better than I had hoped for." This thing wasn't working at all and everyone was standing around with his hands in his pockets--which I have found is the American male's symbol for saying, "Don't ask me to help!" They were watching a nineteen year old try to get a vehicle to work in water. It had a thrashing motor and just about the time he would think it was going, it would develop emphysema and cough and quit. It didn't bother him, but it bothered everyone else--for two reasons: They had subsidized his venture and he was a flop. Second, they might have to get in and help, you know. I am attributing attitudes and am probably mistaken.

Back to the article: "Art center students, Aris Nichols and Ron Chesley had designed a sea saucer. They would have liked their toy, which everyone thought it was--and which the assignment was, to be viewed in terms of its usefulness in logging operations, in small boat harbors and so forth. This toy was a safe thing, which was their whole point. You could play with it and have a motor in it and it was safe, but also that it was useful. Cole Williams, seven years out of the California Institute of Technology and University of Southern California, presented his desert rat on its own merits. Ride it and see. When asked if it would descend stairs, he replied by walking it up the steps of the St. Catherine Hotel. It was really a fabulous thing! This fellow was fortunate to have a father-in-law who didn't think he was a nut and who also, I believe, had money. The rest of this is of no consequence.

Lately, someone called me at UCLA and said we are having a jury out there, design students and I wonder if you would come and be on the jury--which means that their regular juror had to go to Chicago, but I fall for any kind of flattery and hurried right up. Among the people to be juried was my old friend, Richard. By now he was working on a device which sounds like a thumping heart and can be set to the pace of a child's heart. This would be a colicky, nervous, restless child. Of course, it has medical significance. He doesn't really read German so he has had to fight his way through the German research on this subject. If you have followed heart studies lately, you know that there is a great deal being done. The child really knows his mother's own heartbeat when he is born. If the wrong person picks him up, it may make him a little nervous because the wrong heartbeat is going kerplunk, kerplunk. There are ramifications here that I won't go into. Richard had located a clock with a ticking device that could be set to go at the same rate as is considered to be normal heart rate. So he got rid of all the other fancy gear he had been using and made his device from the little clock, modifying it to sound like a real heart.

He has a childlike quality that the industry is going to take away from him. In the course of his studies, he was working on a device to measure the amount of dilation of the pupil when exposed to a visual stimulus. Opthomologists and their associates have been using an expensive complicated tool that actually had to be attached to the eye. My young friend had a little deal that simply measured and recorded the amount of light that bounces off. From that information, dilation can be measured. The graphics industry is delighted with this tool. They can now find out how people react to various kinds of advertising. The tool is not in itself terribly valuable to the field of eye research, but could lead to tools that are valuable in the field. Instead, its value is in serious danger of being exploited as a device to invade the mind through the eye--a real freeway in there.

Now here is the kind of irresponsibility I worry about. Scientists (also doctors) have associations for responsibility. "Responsible scientists" means people who are not willing that science should be used for irresponsible purposes. It is a great idea! Then I find that hardly any scientist is willing to have his name put on the list because he might lose his job, I assume, or his opportunity.

The other day I saw two ladies I had seen passing out leaflets in Victoria. These leaflets said, "We really don't believe war solves anything. Do you?" I didn't mind stopping and talking to them and telling them I thought they were right, because I wasn't in my home town. In my home town, I am already known as a crackpot and I just don't want to go all the way over the edge. But I can speak to two ladies in Vancouver. I noticed they weren't in their home town either. It had taken them an hour and a half of public transportation to get to the place where they were passing out leaflets. The community of scientists and the community of graphic artists are more conspicuous communities. The world is the home town.

It would be pretty hard to have an organization that said we disapprove of the abuse of young talent. In fact, we disapprove of the abuse of all talents and we are not going to hire, or work for people in situations where talent is abused. But I suggest that you consider the idea.

The next kind of responsibility is in a larger sphere than the communications industry. I will try to introduce it by an anecdote. This morning my husband said, "I wonder if you should call Mr. Tara and say we are ready to go. Do you think he wants a ride?" Well, I don't know whether he rides with us because he wants to or becuase he is polite. Would he really rather walk? We argued back and forth and finally decided the real point at issue is that if he wants a ride he should know that we are leaving. It has nothing to do with this business of the shell and the bean under the shell and trying to guess whether the bean is under the shell or not. If you are in high school you are trying to decide how to get to be a "cool" and not be a "wimp." The real question is how long the cools are going to keep on wearing whatever they are wearing or doing whatever they are doing. And, of course, the "cools" are busy trying to figure out when to quit doing what they are doing before the "wimps" get to doing it--almost a social instinct! Very frequently heavy pressures are on us to make decisions to do or not to do something in terms of process or out-guessing or appearances rather than in terms of outcome--and rather than in terms of cyclical completion.

We worry about such things economically as over-production. If you are a pre-Keynesian, you worry about supply and demand; if you are a post-Keynesian, you are in another area entirely. But economic problems are really devices. Nature produces, I am sure, eight times as many birds as ever get around to singing and about six times as many eggs as ever hatch. It doesn't matter because the eggs that don't hatch return to the soil and they do it gracefully and decently and even beautifully--if you don't think so, look at all the photographs of eggs that didn't hatch and are broken at the base of a lichen covered tree. It is a common exercise for the photography student. Lots more trees are produced than are needed. Speaking of acorns, or squirrels or diatoms or anything, nature doesn't worry about how much she produces because she has a system of gathering things back up and letting them die decently, decay productively, return to viability. (I am really fairly sure that they are always viable in a sense, not as a bird, for example, but as a substance.) But we don't do this.

We design a refrigerator or a car or Life Magazine or cigarette packages, (the cigarette package is really the worst; it lives so much longer than its life), the gum wrapper, the styrafoam cup, the beer can. In California at Yosemite they have an organization--I don't know whether it is Girl Scouts or Campfire Girls. (We were talking about organizations the other day--I have belonged to only one organization in my life and I've finally figured out what it was--an organization for people who are never willing to belong to an organization but were dying to be included. So they are all in this great ridiculous organization.) But anyway, the thing I know about either Girl Scouts or Campfire Girls is that they have beer can collection trips in Yosemite. They put the beer cans in a pile and then they put a bonfire on top and then they sit around at night and sing. The fire burns off the permanent finish. Otherwise, it takes the beer can five years to rust away, unless it has some kind of an accident that cracks the finish and allows the rust to intrude. If left uncracked, the beer can surface, subjected to heat, will erode and then the can can die a very decent death and return to the soil.

One time I talked to Bernard Benson about this (when he was twenty-one years old I believe he was in charge of seeing to it that everyone in the Armed Forces in England had what he needed. At twenty-one, he worked out the system of distribution for doing this). So I talked to Benson about death and decent decay. He was triggered immediately, saying, "There ought to be cigarette packages that last as long as there are any cigarettes in them. Then they fertilize the soil." One element of the problem is the completion of the design cycle--a cycle that encompasses a productive life for an object in the role for which it was designed, then deterioration, death, and return to productive life. Well, everyone says--"But this is expensive!" Have you ever thought how much it would cost to gather up all this stuff and restore it!" So the conversation ends.

We have had a two-year in-public airing of our trash problems in Los Angeles which would be droll except that it is humiliating. The argument is, "Should ladies have to sort cans, paper, and garbage?" The final decision is, that is not a nice thing to ask ladies to do. So now ladies can all put all of these in one can. People on the not-nice side of the fence point out that if ladies did sort this stuff, it would be possible to do one thing with the cans and bottles and something else with the papers. A very elementary retrieval is involved here. Then a man came along with a pretty good invention. I haven't seen it working, but my mind visualizes it because I have a Rube Goldberg mind anyway. This thing goes along above the mixture of garbage cans and bottles and picks up anything that will react to a magnet. (Now that beer and soup are in aluminum, new logistics problems emerge) What happens to bottles, I don't know. We argued about this matter in public on television, radio, and in public meetings. I don't mean I personally, I mean the community of Los Angeles, which has four or five million people in it... arguing publicly whether to sort their garbage and have it in one or more containers. To me, this is a baroque worry. The real worries are waste and cost.

I will now drop the subject of the waste of graphics talent--because I believe I have over-extended it. The talent that goes into magazine production each year--not each year, each week! The temporary simple, underuse of the result is to me extremely shocking! But the more serious waste of purchased scholarship is even worse. I came across an example this week again because I am always saving things. I brought it with me today, the Courier issue on oceanography, as I want you to see it too. Out of print! I hope that you will be addicted to it and have to go to the second-hand magazine store to find it. If you do find it, I will be amazed, for it is mostly in the bottom of Land-fill No. 2. (Since I left Los Angeles, I am positive that No. 1 is finished and they are on No. 2) The Courier's great research, currently important, a casualty of the Southern California public debate--research falling under the onslaught of cans, bottles, and garbage.

I must go back to the class I teach to make a demonstration. The teachers say to me--"Our real problem is that children call everything that is a baby, a baby. They say a baby horse, a baby cat, a baby elephant. They really ought to have a better vocabulary." So the teachers wish to work out a vocabulary building program. (Now that reminds me of a letter to Ann Landers which said, "My girl friend objects to my swearing. What should I do?" My son read it and he said, "There aren't any nice words to say what I have in mind when I want to say certain things." Ann Landers suggested that the boy try to find acceptable words for expressing his thoughts.

"There must be nice words for expressing nice thoughts or any kind of thoughts," she said. My son's answer was, "There aren't any nice words for expressing the way I sometimes feel. If there were, it wouldn't be the same." No matter how you build your vocabulary, there are just not words to express the way you feel. So building the vocabulary is to me also a baroque worry.) However, the case of children who say "baby," I knew what the teachers were getting at. So we started out looking for pictures of mothers and babies.

In my class, it works this way--speaking of retrieval of information. You get a room that is three times as big as you think you will need. Each person blocks off three times as much space as he thinks he will need, and then says, "Excuse me, but I am saving that place" if anyone comes near it. The rejected one says, "Well, where will I work?" The squatter says, "See that counter over there with the stove? Just put a breadboard on top of the stove and you can work over there." Everyone is very polite but no one budges an inch. Each person has a standard like the ones you see at the conventions that say "Waukeegan Delegates." Instead of "Waukeegan" we put "Mothers and Babies," if that is what we are collecting. Or if we are collecting pink or red or anything to do with Christina Rossetti's sonnet on the subject, we put up "What is Pink?" Everyone looks around this sea of junk and shares what he finds as he is leafing through a mile high pile of Life Magazines the neighbor was glad to get rid of. (The neighbor knew that they shouldn't go to Land-fill No. 1 but had no use for them. It is like things in the icebox; they are not appropriate or enough to eat, but too good to throw away.) So everyone comes to my class with a car full of junk. You can identify them a block away because they carry what old people refer to as "a lazy man's load." They are sure they can do it all in one load. As a result, they end up making three trips because of droppage.

So we run up flags all over saying what we are looking for. Everyone leafs through magazines in a great hurry, looking for president's wives, kind of trees, state flowers, whatever you want. Don't think I am making triviality and mothers and babies! You find pictures of grown-up pandas and panda children; grown-up deer and fawn; and bears and cubs; if that were all we were doing, it might be trivial. What we are really doing is sharing and telling. In fact, that is what we call the class, "Share and Tell." If you have or have had kindergarten children, you know what that is. If it weren't that there were by-products, ours would be the most ineffective process in the world. We take a subject like "groups." I had no idea there were so many words for groups of things until my class started looking. The one that tops them all--of course, you know "pride" of lions--is "murmuration" of starlings. Someone gets the idea of collecting groups and we collect groups and argue, discuss, exchange views, solve common problems enroute. Now my pitch here is that there ought to be some way that graphics talent, reproduction, and research once purchased for one function should have a secondary retrieval and redistribution. Life Magazines and National Geographic do set up secondary use, but in a most curious and limited way. The latest of Life's scientific publications are really very good, but they have a kind of restricted ordered, fenced in recollection. There is no allowance for personal variations in demand and need or use. I know a simple way to allow for such differences; again, it sounds trivial to tell it. A depot of some kind is needed and a distributive cataloging system plus a constant shifting content in the depot. I suggest that the graphics industry could serve the teaching industry, not on graphics industry's terms or even supervisor's or principal's terms, but on teacher's terms. I am aware that the system I propose as I describe it is certainly loving-hands-at-home, --but no less on that account subject to positive and fruitful machine data processing.

My class is a loving-hands-at-home operation. Ladies really don't know how to use a paper chopper; they have to be taught how to use it. They not only can't use a templet, they can't spell it. If you handed them a keyhole saw they would say, "Oh, father had one like that, but I thought it was square at the end." They have never seen a keyhole saw that wasn't broken. This is not to discredit them. I am asking them to make use of talents and skills that are essentially masculine and remote in our culture. I have a paper choppper called the "Slide-N-Cutter," which is very slow--it is a print trimmer, brought up to date. It says that if you put the edge of the paper over here and cut, you will get a piece of paper twelve inches wide. The ladies in my class don't believe it. It couldn't be twelve inches. You can see that it isn't twelve inches over to the bar. They have a good eye for distance, but they don't realize that the cutting edge is to the right of the bar. Further, they don't realize the tool wouldn't say twelve inches if it didn't mean twelve inches. The bar that holds the blade is about two inches wide. The cutter is like one of these "Rollmeter" tapes that you pull out. You have to allow for two inches on the end because of the case. I ought to keep statistics on it, but I don't believe I have ever got one of my teachers to believe that tool. It is the least dangerous tool of any that we have. It will cut any kind of an angle that you want. It is absolutely clean. The blade is cheap and if it gets ragged, you can give it a quarter turn and use it again. They don't believe it. Once more, I do not tell this story to discredit teachers. I suggest that they are helpless. They need a kind of a service which you could provide.

Now then, back to the student who has the marvelous innocence. He doesn't notice that all the industrial designers are standing around there with their hands in their pockets. He notices that the exhaust pipe is too short, and that he has to figure out how to re-align some elements of the design. He had been given an outboard motor by the manufacturer. He said, "Gee, this thing is really unbalanced!" So he redesigned their motor, not the housing or the motor itself, but the alignment, so that it would function properly. It didn't occur to him for one second that it would make them mad. Of course, it did. They were enraged. He had been given the motor to design use for it; he hadn't been given the motor to redesign the way it operated. But he was so straightforward that he was working on the problem at hand. He was not playing the game of which shell has the peanut under it, you know.

This kind of innocence is what I am trying to get at here. The group of teachers I talk about has a kind of innocence. They have an immense need and they try to serve themselves. How many do I reach in a year? I have about four classes a week, four times a year. There are about thirty to forty at the most in any one class. You can't erode much stone with water that is dripped that slowly. So there has to be the kind of service I am talking about, a service performed on computerized levels, making use of equipment that is already on hand. The technology needed has already been paid for. Certainly the subsidized throw-away mail people are equipped to help.

Another demonstration, but remember--not the demonstration, but the point. I talk about my neighbor in the Art and Civilization class. I say my neighbor likes red. Her living room has red bricks, red damask curtains, red street-car plush on chairs (she has four boys), redwood on the wall. This time I am explaining what red is. And next week I will tell something else about my neighbor--she has a view of the Channel Islands and no windows on the west. Finally, one boy comes up and says, "Look, I came here to take Art and Civilization. I didn't come here to hear about your neighbor." My poor neighbor doesn't even exist. She could live in Tasmania as far as that goes. So I am afraid that the demonstrations may be mistaken for the thing. I use the following demonstration merely to say I think this problem is characteristic, not just in my town.

We have a post office box because our house is nine hundred feet from the road. We don't have any neighbors because we planted them out. I don't know whether they have red in their living rooms or not. So every time I open the mailbox there is so much mail in it that you can't get it out. When I finally get it out, I go to the counter and throw away all the stuff I paid taxes to have sent to me. I used to read it because I thought that if I had paid taxes the sender had hired good graphics men and had gone to all the trouble of putting my name on the list, I ought to read the message. Not so! Well now, the system that got me on the mailing list can serve the teaching profession. If I happen to emphasize the elementary teacher, it is that she is the one with whom I work. It isn't that I think that you cannot overemphasize it.

A week or so ago, my husband and I went to a conference in Aspen that we attend every year. At this conference John Cage said that with the kind of communications techniques and services and distribution that we have, man is getting to be rather like God. He can be everywhere without leaving his chair. Earthshaking! If you go to Aspen every year between about June 17 and 27, you can travel the world over with all the comforts of Aspen. You can hear more talk than you care to, but always within it is something you have been listening for for years. Then, if you are foolish enough to save the printed materials they hand out, you can always go back to it. I have a twelve-year collection of transcripts of International Design Conference at Aspen. I am convinced that a lot of the speakers would like to take a lot of it back, but they can't; it has been printed and distributed to a group that doesn't do much reading so it doesn't really matter. They probably file it, but don't retrieve it. I brought one year with me today, planning to read you some of the things that various people had to say at this conference. It isn't an earthshaking thing which is one of the reasons probably that is pretty good. It is an inquiry. People who go there who are not supposed to be speaking and telling others what to do or think. Everyone goes there really to assess what he has been thinking. Then there are the scenic splendors in the area that tend to cut you down to size. You get up in the early morning because you are at 8,000 feet and walk down an avenue of Aspen trees that have been put on either side of the footpath to Herbert Byers' new tent. The old tent which I like better is gone, but the new tent is good if you figure out how not to sit behind a pole. Even though the conference is set up to get in its own way, it still is effective. It happens in the summer during daylight saving time. (I should tell the people at Aspen never to hold the conference in Bellingham; it doesn't get dark here until 10:00 or 11:00. I called my son the other night and said, "Is it dark down there?" He said, "Of course, it's dark!" "Well, it is not dark up here. I thought maybe something had gone wrong----.") At Aspen, you know, it is light forever too, even without daylight saving time. Finally, you walk over to the tent about the time you would normally go to bed to see their visual program which this year turned out to include "The Hotdoggers." I love "The Hotdoggers" and was glad to see it for the fifth time, but I had the feeling that it was a little late to be bringing it to Aspen. We live near UCLA so it is just possible that being closer to the source, we have seen it oftener. It is an uninterrupted view of a youngster on a skateboard at the top of the hill at Pacific Palisades just a little bit north of Santa Monica. I don't know how the camera kept up with this kid. He goes down the hill, off the driveway, back on to the sidewalk so that he never has to get off the skateboard. And all kinds of bathing beauties in Bikinis go by. They don't care that he is going by, and he doesn't care that they are. There is a wonderful privacy: He is in a kind of cocoon that goes at lightening speed. The Bikini girls have a range of interest that doesn't include some eleven year old on a skateboard. It is a fantastic little movie. He finally gets to the beach, sees a loving couple there. They have a surfboard but are interested in other things. So he tries out the surfboard and realizes that with practice he could get to do it. He puts the surfboard back; the loving couple still hasn't noticed him; and he goes home. It is not significant, except as a comment on the time we live in--the surfboards and the skateboards are lonely skills--like skis. Your antagonist is not someone else, but the sea or the incline. You are not a member of a group with a group to challenge; your antagonist is a hill and a sidewalk and the accident of other people on the sidewalk. Skateboards are very dangerous. Skis, of course, are dangerous. On the surfboard you are fighting with a moving nature. It is true that the avalanche can get you on skis, but that is not as routine as the ocean waves. There is a lonely disdain in the pursuit of sport of the surfboard or the skateboard or the ski that someone should research.

I really didn't mean to get on to that except to demonstrate feelings I have about young people. Cage says, "Let the old ones go. Too late to do anything about them." On one hand, I feel bad about it, but on the other hand I look at a man like Buckminster Fuller who never got over being a child--he has the kind of innocence I keep trying to pick apart. We were talking about this thing during intermission. On television the other night, there was a girl from Israel who had this quality. She didn't say I wonder if I should mention that that man has----. Do you suppose he knows it?" she asked. Take a run in the stocking. You can't decide whether to tell the lady she has a run. Maybe she had it when she left home; maybe she hasn't got a spare stocking so she can't fix it anyway. Once more you play a game like the shell with the bean under it. Back and forth. This innocent person on the television came right out and said to the man, "How does it happen that you understand Israeli, are you Jewish?" The man said to her, "Look, I changed my name, I had my nose shortened and I took a course in diction. It took you less than two minutes to find out that I am Jewish." The lovely young girl from Israel said, "I should think you would have been proud of what you used to be." This innocent philosopher! She wiped him out without any malice whatsoever. She spoke as she saw. Buckminster Fuller has this quality. And I think my young friend Cass has it. This fellow is an informed person in the areas in which he is informed, but he doesn't have any of the road-blocking "should I's" in his makeup. Now that the graphics and advertising people have got hold of him, I have a feeling he may change.

A moment ago someone told me something else very good. If you have lost this quality of innocence, you can never go back to it. If you try to hang on to it, I am sure you would squeeze it and spoil it. Also, innocence like intimacy has many meanings. When a psychologist at Aspen tried to explain a matter involving intimacy, the audience went to pieces. Most of those present had young children or adolescent children. They all panicked over the subject of intimacy, because their meaning for the word was colored by their worries. They interpreted "intimacy" (the word) in very small terms. So by "innocence" I really mean a kind of a straight look, an uncomplicated view; a doing of things directly instead of for secondary reasons. An example of a primary reason as opposed to secondary: If you are going to be mean to your children, just be mean to them. Don't hire someone else to do it. That would be an example, I think, of innocence.

Now the communications field of responsibility is this: Control of redundancy and protection of the language. I am going to read something to you in order to remind you I suggested your students ought to read. It is a paragraph from Cass's very recent presentation of a design problem toward the completion of the masters program. It reads--"To avoid limitations imposed by the photographic technique such as undesirable time utilized for film processing and pupil scale measuring, the writer developed a new approach for measuring pupilary dilation and constriction which simplifies the procedures. The test subject is seated--etc.--." This is what happens when we do what the baseball player called "languagifying." Read "Who Flang the Ball?" a story written to explain the appeal of an early baseball player who had no sense of syntax, who said that he "slud" into first base. He planned to "easify" the language by getting rid of all the "languagifying" that went on. He would make all the regular verbs irregular so that all verbs would then be regular. It is reprinted in Weigh the Word. At any rate, this master's project is "languagified." When the student was simply writing to his mother to say what he had been doing for two years, he wrote in straightforward terms; he didn't use words like "utilize." When they make verbs out of nouns, use the passive voice, or do anything to complicate the problem of getting the message across, they have been overeducated. In a sad way, education tends to make hard answers for easy questions and complicate hard questions with language.

I know a boy who when he was a junior in college, thought that he knew what Ethiopia ought to do. He had been reading about Ethiopia for years and what he knew about Ethiopia you can't believe. Then he worked out a plan for bridging the gap between cottage industries and extractive industries by making use of unused talents and equipment and tapping excess services, and abilities of manufacturers in the United States. His plan was to build up an industry in Ethiopia that employed the people in the cottage industries and served the people in the extractive industries. When the people in the extractive industry had all the goods they needed, it wouldn't make any difference because by that time the people in the cottage industries would have the money to buy the things they had been producing. Well, he checked out all kinds of things like caves, scrap-iron, the climate, the average rainfall and altitude and ended up with a paper that was really quite profound, considering that he was a mere boy in college. By a serendipity coincidence, he met one of the directors of the Blue Nile Project. This man said, "Do you mind if we reproduce your paper for the men who are working on the Blue Nile Project?" So the boy said fine and dandy, and the paper was sent off. It gave our simple young friend some sense of importance which is a dangerous thing. He set about as a graduate student to improve on his idea because by this time he had decided that he ought to go to Ethiopia and put it in practice. About the middle of the year he got an annihilating illness--sometimes I think illness is a great thing for people--mononeucleosis. He couldn't do anything, so he wrote letters to economists, anthropologists and sociologists, sending each a dossier on himself and asking what they thought about what he believed ought to be done in Ethiopia. Once more, a form of innocence. I would no more write to Margaret Mead to ask what she thought about my idea for improving the state of women, but this kid didn't hesitate. He sent off to Burdick (The Ugly American), Margaret Mead, and any writer whose works he had admired. Everyone wrote back with a serious critical comment. I suppose it takes innocence to recognize it. And some said, "You are mistaken. It will never work." Mrs. Mead said, "I am giving a lecture in Los Angeles. It will be easier to talk to you than to tell you what I think on paper. So meet me after the lecture." She was in a wheel chair--had a broken leg. They had a long conflab out of which came Mrs. Mead's question, "Have you thought about what would happen if this paper fell into Haile Selassis's hands?" It was a wide open communications area. Eugene Burdick said, "Come up to Berkeley. We will talk. It is easier to talk than write." (These people write for a living.) Mr. Burdick had had a heart attack and was expected to walk and so he and the young man walked around Berkeley and talked.

Ultimately, he returned to school where the professor--a victim of the languagifying process--got hold of the papers. All actives became passive. All his first persons became third. All his "I believes" became "this writer thinks." Many Anglo-Saxon words fell before anglicized Latin words. His "You ought to use what you have" became "Utilize the resources of the situation." And the idea was trampled!

Now I believe communication is hard enough; we ought not to complicate it with language. We ought not to complicate it with the oblique, like arbitrary rules, vocabulary and symbols that have to be agreed upon. There was a kind of a nineteenth century agreement that you dignify things by complicating them, that you make space seem more valuable if you fill it up; if it is simple or empty, it must be trivial or useless. As a matter of fact, you can get a collection of words which we associate with poverty. One is "bare"--a bare floor. We have lived where we do long enough for our children to have left both kindergarten and college, yet people are still asking us, "When are you going to get your rug?" To me, and I'm sure to you, the bare bones of the thing would be the essence of communication and therefore good enough. You need not embroider it. And it seems that the talent for meaningless verbal ornament exists largely among non-visually oriented people.

Once a communication of a high order took place at Aspen. I am trusting my memory of it, so I may destroy the point. The president of Swarthmore College was at this conference. He had worked his way through school, playing clarinet on ocean liners. Richard Morris, who teaches sociology at UCLA and can sing exactly like Louis Armstrong, was there. After a day at the conference, during which a great many very important things were said (none of which I can remember), Dr. Morris and the Swarthmore president took over a basement cafe from four young singers and a guitar player. I remember that they played "Mac the Knife," improvising lyrics as they went along. There was a kind of communication that evening so immediate that the next day everything profound they said had meaning. They came across as light-hearted people. In a sense, they initiated the group--took everyone in the fold.

I'm sorry I am the only one here who can remember the night. It is a little like being remembered, not for what you did right, but for putting the "N" in backwards or pronouncing "SINEWY" as "Sweeney" or being Roy Riegels. In Utah, in the snow areas there are green sand cans along the highways. They all read, SA--backwards N--D. It would be hard for me to remember that if roads were icy in Utah, there would be sand available except for those backward N's. When I was a very young teacher, I wanted to design a printed program myself--design it and say what kind of type to use. Of course, I didn't know body type from display type, and I would probably have used condensed century bold, but I still wanted to do it. Well, they finally let me design one for the spring music program. One of the songs was called "Homing" by Theresa del Riego. The reason I know is that I put on the program Tierra del Fuego. It looked all right to me. No one remembers that it was a pretty good layout done under extreme handicap, and that we worked out a way to justify outlines so that there was feeling of containment on the page. The only thing anyone remembers is that I didn't know who wrote "Homing." People remember things for some reason that is peripheral rather than basic. I remember a certain Aspen conference as great every time I hear "Mac the Knife." Anatol Rapoport summarized that conference in this way: "Several things have emerged from the conference. There was the general agreement that solving problems was as characteristic of man as any other crucial survival mechanism is of the species which depends on it for survival. There was a range of opinion, however, as to what constitutes solving; about the relation of problem solving to that elusive prestige-laden character trait that we today call "creativity," and above all, a range of opinion about what important problems are. The last question, of course, pertains to values. The participants showed much concern for values, how to choose them, how to decide their relative importance, how to realize them. This is as it should be because problem solving is meaningless unless problems are probed. And problems cannot be probed without values. So much is obvious, but it is by no means true that a problem solver faced with a specific problem always examines the issues involved. Typically, the problem solver goes on to solve the problem because that is his job, or which is more important, because problem solving becomes natural to him. When people are trained as problem solvers, the solving of problems whatever their import, whatever the impact the solutions have on individuals, on society, on humanity itself, problem solving becomes an end in itself, an activity richly rewarding to the human psychic. In practice, however, the first role obscures the second, the second subverts the first. And let us see how this comes about. The emphasis on the instrumentality of problem solving reduces science to technology, turns art into propaganda for advertising, demotes education to training and character-building to brainwashing. Whenever anything is done that must be justified in terms of the end achieved, the end tends to become simplified. Since the simplist ends are those which can be expressed quantitively and since man is most easily motivated by appetite, the utilitarian component of problem solving is the vulgar materialism of which American civilization has been so frequently and sometimes justly accused. Let us look further at how our creative activity is channeled. Whenever business people meet with professors or with artists, they are quick to point out the creative aspects of competitive business, probably because professors and artists tend to ignore these aspects and to cling to their stereotyped image of the Philistine businessman. I for one, am deeply impressed with the businessman's argument that there is ample opportunity for creative problem solving and, hence, for self-realization in competitive business. However, when I look at some of the ends served by this expenditure of creative talent, I am appalled. Need I remind designers of the crimes perpetrated against their ideals because do-dads cater to infantile fantasies, which themselves have been created by the ad-man in his pursuit of the distinctive features that give his product a competitive edge." Well, that was Anatol Rapoport! You see, if I had gone back over my file I wouldn't have wasted all your time. I could have just read what Rapoport said.

Now, I am going to put you through some nearly precise quotations, not in the order they appeared at this year's Aspen conference, but in the order I think they might have appeared if these men had been able to talk to each other. I believe they have relevance here.

Henry Wolf (Art Director): "The real obstacle royally neglected in speeches so far, is money. Art and money. Your work and someone else's money." He suggested a box cornered by the terms art, love, money, and time. The artist, he says, works for love. "If he works for money, he has a profession and enters the field of diplomacy and compromise and gets promoted to the front office when he is able to say, "maybe." If there is a marriage of time and love, the result is nostalgia.... If love and money get together, you have a question that has to be pondered later." Wolf spoke mockingly of baroque worries such as the New York Post's concern over Greenwich Village and LSD, or the art critic's assessment of Cezannes dependency on geometry. Real worries, he says, are health, love, age, and applause.

Ben Shahn: (Painter) "Food is culture, too. Can't we include wheat as a cultural contribution?" He was talking about a plan to send paper books as a cultural contribution to India. I thought India had enough culture. "Designers might think of a way for the man who picks cotton to have sheets, or the woodcutter to have a better house, or a house at all. The design area is a greater distribution of the great thing we have now." (Shahn has a rumbling, slow speech with a fine New England overtone which is lost in my presentation.)

John Cage: (Composer) "We have a global village whether we like it or not. (He was quoting.) There are 55 global services. The mountain range dividing Oahu was formerly crenelated. The crenelations were for self-protection while shooting arrows. This mountain range is now tunneled, permitting the populations to circulate."

Farsson: (Psychologist) "The sixth right (he listed ten) is to be a citizen of the world, to travel."

John Cage: "Fuller says as long as one human being is hungry, the entire race is hungry."

Beinert: (Architect-Planner) "Art is in one sense subversive. You use the opportunities around you. If I hadn't held art classes they (the students in Africa) would not have got better clothes. Actions are never one or the other."

Farsson: The ninth right is to be helpful, to love as Beinert does."

Corrigan: (Teacher) "The artist's role is not to give order but to reveal ambiguity." (Corrigan could have stopped right there and never said another word and I almost wish he had.)

John Cage: "What will happen when intelligence is recognized as global resource (a reference to Fuller).... alteration of global society through electronics so that the world will go around by means of united intelligence rather than by means of mass divisive intelligences such as politics and economics. All technology must move toward the way things were before man began changing them."

Ben Shahn: "Chaos is our unsung, unnoticed friend. There is long endurance and predictable decay when everything is orderly. In conflict, changes have been born. Order is not unqualified good. The poet breaks out of the perfect place in search of fresh air."

John Cage: "Conflict won't be between people and people, but between people and things."

Farsson: "We can expect a new bill of rights for the achievement of the good life. The right to leisure is now time off work. In the future, we will have the right not to work and still be a worthy human being. You have to get rid of a lot of guilts to do it. Usefulness is asked only of things we don't care much about."

John Cage: "You will have nothing to do, so what will you do?....A life-long university."

Farsson: "The seventh right is to study and to start studying as experience. Really, studying is a worthwhile experience in and of itself. It is not merely intellectual experience but interpersonal." (I know it's true of the one field that I know about. It is probably true of physics and chemistry for sure, in the graphics and industrial design fields studying can be most readily interpreted as an experience that is worthwhile in itself, not as preparation, but experience.)

John Cage: "Do not imagine that there are not many things to do. We need forinstance an utterly wireless technology."

Beinert: "I have had to re-evaluate every kind of thinking I have ever had to do before."

John Cage: "How we receive bad news can change. We are glad to hear unemployment is increasing. Soon all that will be required of us is one hour's work a year, says Fuller."

Farsson: "The right to the truth is the seventh right....this new generation is the honest generation....the right to present yourself and share yourself.... the new generation does not censor what it says. We are no longer to settle for deceptions, invasions, product claims, investigating agencies, control."

John Cage: "Advertising has discredited itself. What is advertised we avoid."

Tomas Maldonado: (Industrial Designer) "We have a new kind of young people. The attitude of young people is honest and aware....critically conscious.... there is a new personality."

John Cage: "The old ones, let them walk out, there is not much to be done about them in any case."

Peter Reyner Banhan: (Editor, "Architectural Review") "Injuring and maiming students is the biggest global bore we have. The middle mass of students we have is tough and brash. Sensitive students drop out. Sensitive humane talent gets driven back into the wall, into itself. Students are uniquely vulnerable people. The curriculum is only a bit of the human process of being a student."

Corrigan: "There is a correlation between the dropout and the teach-in." (I am sure teach-ins exist everywhere. The ones I know about are at UCLA, where the student would not miss the teach-in. He takes his lunch along so that he can get a place. He stands on one leg then the other if he can't get a place. He is there all night and policemen come to keep him in order; he is so attentive he has no need for order, but that is the rule. And he regrets that the professor who disagrees with him doesn't come to teach-ins to speak. That is contrary to the way older people react. You see, the student doesn't really want to hear anymore, only those who agree with him. He wants also to hear those that don't agree with him and is bugged by the fact that it is very hard for professors that don't agree with him to come to the teach-in. Hardly anyone can stand up to the young--but the young don't understand that, because they can stand up anywhere.)

Gyorgy Kepes: "The trouble with teaching is partly that learning is accumulated knowledge, a great deal of which has no relevance. We should restructure available knowledge with the least possible waste. We should scan the knowledge of the past to forecast the potentials of the future."

Farsson: "The human potential is not merely what it is; it is what we believe or wish it to be. We don't know the conditions that evoke potential. The more progress we make, the more we must make; improvement brings about insistence on improvement."

Henry Dreyfus: (Industrial Designer) "The compulsion for improving is a special virtue....Pride of authorship must be suppressed....Do not confuse power source with goal....Our source is truth, our resource is science and technology."

Corrigan: (Speaking of art training--He has a huge grant at N.Y.U. with no restraints on it.) "It is kind of like being a Zionist and having the right to make someone else go to Zion on a paid-for ticket with a third person's money--Our first commitment is to the profession rather than to the trainee. (True!) Doctors are best trained in the university where the commitment is to medicine, not to the training of doctors. Our commitment is to arts and not the trainee. Our most talented applicants seem to be high school dropouts." (There was a gap in time between that first set of comments and the last one.)

Ben Shahn: "I have met a lot of kids, but I have never met an average high school boy."

Farsson: "The tenth right--to be different."

Beinert: "To expand yourself and become a part of a larger world."

John Cage: "My idea was that if they wanted to fight, human nature and all that, they should do it in the antarctic with the rest of gambling on the daily outcome and the proceeds for world welfare. War will not be good conflict as we know it. It will be murder pure and simple, individually conceived."

Ben Shahn: "In conflict between order and chaos or between two orders, changes have been born."

John Cage: "Where there is a history of organization--that is, art, introduce disorder; where there is a history of disorganization--that is, world society, introduce order. These directions are no more opposed to one another than mountains are opposed to spring weather."

Tomas Maldonado: (When he talks a tangle of social problems, design problems, teaching problems, sources and resources seem to thread into discernible skeins.) "In our society of the planner, the planned and the planned-for benefactors become malefactors, designers set themselves up as arbiters; protectors end up making life unbearable for the protected. The designers' functional position to society needs assessing. Serviceability has become confused with servility until we have a network of servilities and an ethical neutralization. The authoritarian personality gains power; management becomes mismanagement. Environmental design becomes contradictory and confusing. The new name for comprehensive design is total design. The designer becomes the great conquistador. Our ecology demands an open system, a habitat that doesn't erode our environment, that does not set up things in conflict with persons. As it is, we have violence, sadism, ostentation, aggression, and the bettering of our minds independent of living. A new family of teaching concerns is the relationship between design and the behavioral sciences. Until now, there has been a confusion between predictive and observed data. The relation between design and research has not yet been established. There must be a confrontation between design education and other fields of progress. It is the human problem. We have a new reality. A world of incredible and visual intensity, and when all is said and done, man is not only the subject, but also the object of all design pursuits."

## LECTURE 5

There are so many things to be said that I feel like my uncle who says he has so much to do he thinks he will take a nap. Everyone, myself no exception, brings his experience, his capabilities, and his limitations with him. I never thought of the negative or the other side of the coin, that is, that people you don't like aren't your friends and that would be a pretty good area for this activity. Speaking of the collections, there have been some astoundingly moving choices on the subject of friendship and love--some droll ones, too. I have come to believe that friendship and love are sheltering or protective emotions. Occasionally someone comes up with something that says so graphically. (NOTE: Students had been asked to bring collections of illustrations torn from magazines, illustrations of love or friendship--wordlessly shown.)

Years ago, we did a series of exhibits by using the device I've used here. We took an idea, stated it in as firm terms as possible, asked students to bring in two-dimensional demonstrations and specifically limited the way in which materials could be mounted. Then we brought the demonstrations together and sorted them into emphasis or viewpoints or extremes--any way you like. Suddenly, we had captions and a sequence and a very broadened look at a topic.

I happened to start a collection on love as a result of a negative situation. A teacher in one of my classes taught profoundly handicapped children. (The word profoundly is used here in a way that was new to me.) The children were about thirteen or fourteen and were handicapped in a number of ways, but they had some very clear cut ideas about love. (They were approaching adolescence. The situation made the teacher nervous.) She believed they ought to have a broader idea of love and affection and logically had concluded that because of their handicap, they might not have been aware of other kinds of love that had come to them, or, for that matter, had not come to them. So she started two exhibits of the subjects on "A friend is someone who likes you" and "Love is a wonderful thing"--in order for them to broaden their understanding of these two emotions. (Until today, I had never thought of the other side of the coin; that is, that people you don't like aren't your friends.) We're back to Cass's comment, "You learn so much about the normal hand from the not-normal hand." (Charles Eames once did some studies on storage, e.g., domestic storage, office storage, etc. He took an extreme situation, dormitory storage, arguing that if you could solve the extreme, you could solve the mean.)

So we started working on a quick hand-showing kind of exhibit like the one I have asked of the present group. The mterials in your collections are diverse and exciting because we have such a tremendous age, interest, and professional range within the group. As a result, there is a much broader collection than would come from all young people or all older people or all art people, or people who all have a certain background and access to type, for example.

Today--I hope to talk about the ultimate completion of the Design Cycle--which we have never completed--so that production, like that of the life cycle could begin to permit, and that is all that I ask, just begin to permit (1) the re-use of the out-moded in new and valid roles, followed by (2) decent death and decay, and (3) re-birth. You know, we don't allow things to die decently. We keep things alive after they should have been allowed to be dead--this is surely true of some buildings. If we don't let them die in their own way, we patch them up and "modernize" them. Last summer, I went through a beautiful Indiana town called Richmond. It was a pre-Civil War town and had been static for about seventy-five years. Then came World War II and G.I.'s. The town began to come to life again. People remodeled, remodernized and renovated buildings that needed only to be put back in order. They didn't need re-designing. Now I have picked on poor old Richmond, but it happens everywhere, not just in Richmond. We put a new false face on something instead of washing the old genuine face. But then, there are buildings that have lived long enough and have a right to die and to die decently. We have a hard time letting things die. Building is not as good a subject to talk about because there are so many special restraints, but if the problem of the completion of the design cycle could be solved on buildings, it could be solved in other design areas.

Now, before we go on to this subject, the other day I made a list of the names of people whom I had mentioned in here that I thought you would know or I didn't want to be presumptuous and make the assumption that you didn't know them. I ended up playing the old game of peas under the walnut shell, so no one knows where we are.

Farsson: (You see how well I don't know him, I can't think of his given name) A psychologist in La Jolla at an institute for advanced studies. There are many serious scholarly people there. He would intrigue you for a variety of reasons. One is that he doesn't look at all like one's idea of a psychologist--just as we assume that art people look a certain way. He looks as if Cary Grant might have been his stand-in. It turns out that he speaks a language that almost anyone could follow. If he says something that could be challenged, he hears the challenge and can restate and move over and doesn't seem to lose his dignity. I find him a good man to listen to on that account.

Bernard Benson now lives in Europe, I believe, but lived for a long time in California. He is a mathematician-engineer-electronics oriented person--very, very sharp. He knows about such things as randomness. When he was a very young man, he had actually the responsibility for the distribution of goods and supplies for the total arms forces in England. If I have it wrong, that is very close to right.

Saul Bass is a graphics man from the Los Angeles area. He does graphics for books and for motion pictures and probably initiated the first big caption revolution. (I call it captions--they call it "titles" in the industry.) The picture you will recall is an old one called Man With the Golden Arm. Saul Bass did the titles.

Jerome Gould is also a Los Angeles person. An Art Center graduate. Gould you will see on screen credits or on book titles.

Charles Eames anyone knows. Eames lives in a house designed by Saarinen in the Santa Monica Canyon-Palisades area.

John Cage--I am embarrassed to do this, but for someone who won't know--is a graduate of Pomona, a friend of Ward Ritchie. I find this interesting because Cage did a good deal of work when he first got out of school on a piano that was in a room where Ritchie was running his presses. Cage writes music of a very abstract, mechanical order. You could say that his music is controversial, but I believe he personally is not controversial. He writes an almost telegraphic English. He condenses and cleans out all the superfluities so that the message and not John Cage is what he hopes to get across.

Of course, it turns out that John Cage is the message. He has some kind of impact that is very hard to describe. When you first hear or read what he says, the sequence seems to be random and I believe that he suggests that it is random. You could argue this point.

Beinert you must watch for. He, a young South African who has a degree in architecture from MIT, went back to South Africa to do something constructive and not just sentimental. He is of European origin, but was raised in South Africa. He had some money, no great amount, to work at teaching Africans who live in compounds or ghettoes or whatever you choose to call them. He observed that the houses in the ghetto which were the merest kind of prefabricated shacks, all had exterior paintings that distinguished them from each other. He made very carefully documented sociological studies of this phenomenon. This information properly told, will appear in Arts and Architecture very shortly. What Beinert says in words does not seem profound and is very hard to quote, but his meaning and his presence and what he documents are profound.

John Neuhart, I believe I said a number of times, is a young graphics man in the Los Angeles area who had done a lot of work with Charles Eames. If you have paid any attention to the Braniff Airlines, Neuhart worked with Alexander Gerard on that.

Richard Cass is a young man who was a student in the area. As far as I know, he was of no great consequence, except that I am interested in what happens to him.

Peter Rayner-Banhan is someone you really should pay attention to. He was the editor of Architectural Review in England, is a writer and a frequent panelist at Aspen and is connected with one of the schools of architecture in London.

Gyorgy Kepes, you have come across before: Language of Vision. Bauhaus-oriented man. Many years at MIT. A surprisingly humanist individual.

Tomas Maldonado is from one of the South American countries and has been until now the director of the design school at Ulm. Ulm is a Bauhaus-oriented school. The needs that the Bauhaus was trying to meet no longer exist and Maldonado's attitude about the changing needs in the design world is a very important one. Better that I not tell you what Maldonado says. He will be in print in a number of places. Just watch for him.

Ben Shahn is a painter, and a political commentator. He says he is not, but he is. He was part of the team of talent that the government hired in the early thirties when the TVA was being built and whole communities had to be relocated--communities that believed that your house is dead unless you take with you the coals of fire to your new house. And even if the new house was going to be equipped with electricity, people had to take with them their coal of fire. At that time, rather than bury graveyards under TVA water, the graves were moved to higher sites, the proper relationship of the dead being maintained at the new site. Shahn had nothing directly to do with this activity, but he had something to do with making posters and communications devices for helping people over a shocking emotional hurdle which, if they could get past, would make life easier and much more convenient, a life with water--running water--and electricity which they had not had before.

R. Buckminster Fuller you know about. He has a number of books out, and an early one is Nine Chains to the Moon, which I find particularly valuable because of its time-line. It is now out in paperback. Another is the Dymaxian World of Bucky Fuller. A good many years ago, he did a set of maps for Life Magazine, using a kind of projection to the extent that mercator or other projections do. If you need that, I will when I go home, check out the date of the issue. He is a geographer, a mathematician, engineer, and architect.

Now I wish to say something about public utterance and communication, beginning with signs. The first series is playful.

Yesterday, after a very beautiful day, we came back on the ferry and got on the road from Anacortes to Mount Vernon where there was a huge sign, "Leaving Anacortes--Why?" A little later we saw the sign, "Enjoy Washington, Canada doesn't have Heidelberg."

There is a kind of logic that you will find in some signs that is absolutely irrefutable, but not explicable. In Southern France, we stopped to see a tourist place and then didn't know how to get back in the direction we had been going. We finally came to a sign in French, "All Directions." If you got on the road indicated and kept going, you could wing off into any direction you chose. Before we actually got on it, however, we saw a sign to the side that said, "Paris and other Directions." It was perfectly logical in the situation.

In Avignon, we saw a beautiful chiseled message beneath a statute of a group of people holding onto each other and wearing stone clothes that are supposed to look as though the wind were blowing. I took pains to read the message and get it into English while observing the quality of the chisel work. I finally decided that this chisel had a hook; for sure, the message did: "Three times the Kings of France came down and seized the people of Avignon but the Union was not sincere." The rest of the message went on to say that after a while the people of Avignon and the people of France came to realize that they had much in common so they joined up of their own accord, but they were not about to be joined up by the Kings of France. I thought the whole trip to Europe was worth that one sign.

When my husband first came to California, he was very young and he had come from a town with brick streets and giant maple canopies in flat, flat country. He couldn't get over California's roller-coastered arteries and graffitti. He still tells what he saw on every culvert and overpass. We have lots of overpasses. Someone had lettered on the first one, "Lawyers is crooks." And on the next one, "Jesus saves." Then the next one after that, "Lawyers is crooks." And so on. Someone has, I am sorry to say, removed these works of art. If you had been on Atlantic Avenue or Long Beach Boulevard about 1927, you would have found these messages.

Vintage modifies the message. The message people put following World War II, concerned Kilroy's stopovers. More recently the medium has changed. The spray can produces a fluid letter form and a hit-and-run message with a different content and quality from that of "Lawyers is crooks." A recent service station blackboard declared, "Special Today: NAPALM."

Now there is another kind of message that makes me cringe because I am inclined to make assumptions. I am fairly sure most of us do, or the kind of jokes that are told to us would die out. We are expected to make an improper inference, not the proper one. In Long Beach, a major street bore a sign for years and years: "Parking for LILLYWHITE Patrons Only." Dreadful! It turned out that the grocery store belonged to Mr. and Mrs. Lillywhite. I went by the store a good many years before I had got past my assumption and saw the other sign on the front of the store.

Then there is the sign with implications. Once I was leaving Berkeley by plane. The plane had a peculiar little noise in it--as women would describe it--and so they decided not to put it back in the air. We would have had to wait a long time to get out. A man nearby said, "Ridiculous!" and called up his son to drive his party to the San Francisco airport. I saw what was happening, and somehow or other managed to be included. Well, I am sure the son was not a bit happy about being torn away from his TV program. To put it mildly, he was quite taciturn about the whole thing. When we were on the Bayshore Freeway, I said, "Oh, boy. We are coming to my favorite sign!" The son lighted up like a church and said, "I work across the street from it. It is my favorite sign, too." The sign says, "Stop Casting Porosity." Of course, the meaning depends on the reading. You can phrase it any way you like--it has many possible interpretations. When I first saw this sign, it was just painted in black. It is apparently a huge success because it is now in neon. I am quite sure it has a fan club. There is a splendid sign on the San Bernardino freeway, east of the four-level interchange. The trouble is that you have to be going west to see it. It says, "Friedman's Bags." The content doesn't amount to a hill of beans, but whoever made that sign has some kind of sense of sky, smog, and gas tanks. Each tank has a filigreed outer shell, a metal net, with the tank sliding up and down inside. The "artist" has painted each of the ventilators on the roof of his building a different color, each one clear and strong. There are natural architectural divisions along the top of the wall which allow each letter a space in a gray field about the color of Los Angeles skies, gray for reasons we won't go into. Each letter space is framed in black to match the tank netting. You can't advertise fog or smog, either one, with any success, but if you drive past that smog-grey sign going west, it is beautiful! I hope Friedman never has to go out of business. "Friedman's Bags" like "Stop Casting Porosity" is unique and cannot be explained, but it's good to know that such signs can still happen in an economy which cannot encourage the unique, the singular.

A good many years ago there were two articles in Vanity Fair which I lost, but then Vanity Fair came out with the Best of Vanity Fair. In it I found my old articles. One was about the shipwrecked man who found the beach with sand made of pearls. By the time he was rescued, he had ceased to value pearls. When he got back to city life, he had a few pearls stuck in the seams of his pockets. These lasted him a month or two. When he wished to go back to the pearly shores, he couldn't remember the longitude and the latitude. The point here is, I believe, that circumstance tends to determine the value of things. The other article says that the national personality of any people is demonstrated by the manner in which they give out public information. In France, the sign on the train window ledge reads, "It is not permitted to lean out of the window." In Italy it says, "It is dangerous to lean out of the window." In the United States it says, "The management will not be responsible for injuries sustained while leaning out of the window."

My husband saw a sign in Glendale that said, "New and Second-hand Antiques." We have argued about it for years, and I have no first-hand claim on any information. All I have is something that tells me it doesn't say that; it says, "New, Second-hand and Antiques." My husband says that the "and" was between "new" and "second." We see what we wish or expect to see.

The three advertisements that I tell you about now, are absolutely true. Some years ago, the gas company called up and asked me to cover a conference of home economists. (I must say, I don't believe there is such a thing as home economics--but I went anyway.) We went to see a house (I feel as though you won't believe me) that an unsuccessful candidate for the presidency of the United States later bought. The subdivider had advertised it as a place where you could have "pretentious living." That isn't all. One of the early condominiums with which we are afflicted in Southern California came out with "grandiose living." And there is a company that puts cigarettes in a red box so you can distinguish their purchaser from the other cigarette purchasers. This advertisement shows this chic, small-waisted, elegant woman with her red box of cigarettes. She is surrounded by tall and gorgeous men from whom she is receiving "fulsome praise." I assume she lives grandiosely in a pretentious house. We have a tendency in our society to believe that if it is more and louder and bigger, it is correspondingly better; ergo, pretentious, grandiose living brings fulsome praise.

Sometimes there is a kind of advertising serendipity. In our town, we were barraged with a thing called the Dodge Rebellion about the time of the Kienholtz exhibit. This is a very obvious point unless you don't know about Kienholtz. He is a sculptor who comments on society and does so with some wit, some sorrow and a certain amount of crudity--that is not quite the word. He makes bare-faced, unvarnished comments. One thing that caused trouble and controversy was a love scene taking place in the back seat of a 1936 Dodge. Of course, Kienholtz had no idea that the Dodge people were going to stage an advertising campaign called the Dodge Rebellion and the Dodge people had no idea of the currency of Kienholtz's peep-show--that is the way you had to look at it, you know--through a peep-hole. The coincidence caused lots and lots of sniggers.

Now we come to the matter of taste. (I take a strong position on the grounds of ethics that you don't defend anyone in his absence because you might be saying he said something that he didn't say. So that lets me off the hook for Mr. Tara.) However, the other night after looking at a television program, I told Mr. Tara about it. He laughed and he didn't laugh disdainfully; he thought it was funny, so he doesn't claim that television does nothing more than collect the garbage. The show concerned children in a camp. The leader of the camp looked just the way I think the leader of a camp looks. (I have avoided camp studiously so I am not sure how camp leaders look.) The camp leader said, "All right now fellows, which one of you changed the toothpaste? You know that those fellows that are doing the research on toothpaste have to work for a living and you have no right to fix it so they can't work for a living. They are trying to find out which toothpaste causes the fewest cavities." Right then I thought you could justify sitting through an awful lot of poor television just to hear that.

The word taste by itself has a collection of meanings. If we use it in its usual sense, it is a very undemocratic word. So first I am going to go back to the concept of my taste as opposed to your taste or his taste. We might agree in many ways and still have separate tastes. Some people have a taste for a certain kind of humor, a certain kind of food or activity. There is the taste of the time. And then there is the taste that is used to sort the--what my son calls the 'wimps' and the 'cools' or to distinguish between the 'ins' and the 'outs' or the person who gets invited to join and the one who does not. If you really wish to cringe, you should read the anecdotes in an early edition of Emily Post--anecdotes she uses to demonstrate how to tell who has it and who hasn't. Now all those kinds of taste are really not what I am talking about when I am talking about taste. I have, for example, a taste for bentwood furniture; I may have to choose between my husband and bentwood furniture at some point. One day I found that I could get twenty-four bentwood cafe chairs for $1.50 a piece. So I got them. Who else could do that? So then I had to have hooks put on the rafters of the garage to store them. You should try to hang up twenty-four chairs! Another time a friend called to say that "The 39 Steps" had a great bentwood rocker. I didn't even finish the dishes but went immediately to "The 39 Steps." It turned out that they had two stores. Naturally, I went to the wrong one. On the second go round, I found it sitting on the porch of an untended store. After many trips and phone calls, I finally reached someone who said, "Why don't you just take it?" You see, not everyone has a taste for bentwood. This poor little bentwood chair actually had a crutch holding up one leg. It took me a year and a half to sand, fill, reduce its fractures, and re-cane it. It is a great chair! When Marilyn Neuhart comes by she says, "You are never going to finish. It is not really worth anything. I will take it off your hands." She has a taste for bentwood and is crafty, too. Well, of course at this point you can sit on it, if you don't weigh too much.

Now then, I have a taste for this stuff and someone with a background similar to mine does not have a taste for it. However, I don't believe that he would deny its quality, its logic, its significance, in terms of the industrial design process. It is probably the greatest--you see I can't even talk about it without emotion--it is a very important element in the evolution of popular concept of how a piece of furniture should be made and what its qualities are, what precision is, for example, and the influence of interchangeability on the meaning of precision. Hubcaps are a clear current example, but hubcaps came along long after bentwood furniture.

When I started to teach during the depression, we had bentwood chairs all through the school. Bentwood chairs had so little value as far as the school administrators were concerned, that they couldn't wait to dispose of them and get a chair that will bark your legs--the kind of chair that kids delight in dismantling. The things on the bottom of the legs come off and are great for putting on a chair for someone else to sit on. In addition, if any part of the chair breaks, there is nothing with which to cannibalize. In every respect, except that it was new--in case you give any value to novelty--the replacement chair didn't touch the old bentwood chair. School after school in California discarded the bentwood chair. Of course, you know who was at the back door collecting them, the art teacher.

Now to me, the bentwood side chair is an industrial triumph. Never mind about the caligraphic rocker. The califgraphic rocker is for sentimental collectors and I am one, too. But the bentwood side chair is a chair. It is light-weight, comfortable, versatile, durable, repairable, handsome, ingenious from the standpoint of manufacturing--with interchangeable parts--a great chair! Now, if you talk about taste in terms like that, then I think that there isn't a great deal of argument about it. You can even say, well I see your point and admire your taste, but I still don't want a bentwood chair. It has something to do with logic.

This kind of situation doesn't allow for opinion, only judgment. But then I believe the person who discards the other person's opinion for him often replaces it with an opinion that isn't so valid either. Example: In Los Angeles, a good many years ago we had a court house made of red rock canyon stone from the Sioux River. We have a lot of stone in California but, of course, being local it was both invaluable and inadequate for court houses. (Opinion.) So stone was shipped from several thousand miles away. It was then cut into squares to imitate bricks, and planished to a fairly even texture. Later, concrete formed into blocks imitated the stone that was dressed into blocks that seemed like bricks. Then they came along with tin that was pressed into sheets with a surface that mimicked the cement block that was counterfeiting the stone that was imitating the brick. Now, all the way down the line I believe you can, to a degree, defend the logic of the process. In the very first case, you can say that if you can shape the stone blocks into as nearly a rectangular form as possible, you can put the building up faster and with greater efficiency. Further, there is then a compatibility to other building materials because there are common lines of reference--vertical and horizontal. But past that, each one of the imitators is worse than the other. When I was a child, we stayed in a hotel in Sacramento. (I imagine the hotel went out of business afterward because we had never seen an elevator with a control that children were allowed to press.) This hotel had small cooking quarters for resident families. The wall behind the stove was covered with oil cloth that was printed to look like bricks. The manufacturer wasn't satisfied to have it printed merely to look like bricks, he had had it printed also to look as if the wall were cracked. I thought it was great, simply great, and I went in there and looked at it all the time. My mother was very upset and said, "That's the kind of stuff one finds in hotels!" Now the real logic to it was that the surface wiped off easily; most mothers will tell you that there is something to be said for surfaces that wipe off easily. It still wiped off easily even if it was printed with imitation bricks and imitation cracks. I am not sure at this point that these points are points at all, but I hope that, if you think about them maybe they will turn into points later on.

Popular language seldom keeps up with the technology of the time and there are certain fields in which the problem is especially noticeable. The field of this morning's speaker is an example. I believed he was absolutely great, but I might have been listening to him for the wrong reason. He used the word "contaminate" in its old true meaning; that is, to add something to reduce purity, but not necessarily to make the original substance no good or dangerous. We use contaminated to suggest that now something is no good and you must not touch it. To explain how he would dust off the plate of dust on the plate, he used the words "cascade," "Powder cloud," carriers," "toners," very nearly the language of the hair conditioning field! He said "liquid" emanation" which seemed backwards to me. Then he had another one, "dry liquid," but when he got through explaining it, you could see the dust boiling. Beautiful! He described a brush made of iron filings and a magnate. Not only do they know something about printing processes, but they know something about language in that field that the rest of us could use.

Now his field creates the problem, or is one example of creating the problem, that I was worrying about when I chose the topic for today's talk. That is the problem of disposal of what is left over when you no longer want it. The speaker very carefully didn't use the word "immortal master" but the printing world has one! In about 1948 or 1950, when we first opened a typography laboratory at the college, we used to call up anyone--Saul Bass, Ward Ritchie, Forte-Cone and Belding, Foster and Kleiser. We would say, "Our students would like to hear what you have to say. The topic we have in mind is...." I don't know what they thought, but they always sent someone out to talk. One time a man came who was just back from Germany. He proceeded to tell us about good, new printing processes and also advised us to go see one of the good old processes over on Soto Avenue. So I took all my students down to watch them print Life Magazine on a good old press, i.e., one which may print fast and lots, but even so, the masters wear out eventually. (Masters which operate magnetically do not! They are, in fact, immortal.) It turned out that Life Magazine was printed coincidentally in at least three places in the United States at one time. All the time the press goes flap, flap, flap in Los Angeles, it is also going flap, flap, flap in Chicago, Philadelphia, or New York. If in Los Angeles you have discovered that they have misspelled Ben Shahn, you can't correct it. The press is activated through a roll of paper with air-holes in it like a player piano roll. You must call up the man at the nerve center and say, "They have misspelled Ben Shahn!" Whereupon he makes the correction at the central office and the nervous system is all corrected at one time. That was not the Curtis press, but it was certainly a descendant of the Curtis press. They were laying on five colors; I clocked it at five runs in about three seconds. And all that is old stuff today! And, as this morning's speaker said, "Twenty years ago we were doing thus and so and that was just about as it was at the time Columbus began to realize he had not hit mainland."

As I pointed out to you the other day, because I wanted you to worry about it all weekend, what are you going to do with all those Life Magazines in your garage? What are you going to do with all those great photographs that aren't being used, that someone looks at while waiting to get his tooth pulled. This is a drop in the bucket. There is an immense amount of material being produced. Take General Dynamics and all the printed material that goes through General Dynamics. Now there is an additional problem--no one is supposed to know about it, so it can't just be handed to the trash man on the assumption that he would be willing to take it. Chances are he would say, "If you don't sort it, you know, we can't take it." You can't give it to him anyhow because it is classified. There is the problem that is going to submerge us if we don't do something about it!

One way, of course, is to consider that the design of something must include the possibility of a reasonable reassembly, a reasonable decay and decent death as part of its design. Life is a strong force and things that seem to be dead will try to be alive.

May I digress now to ask for your help. If you know of anything like what I am about to describe, I need a glossy photograph of it. You don't have to make one, just tell me who will get me one. Over a period of years, I have been looking for things that come to life after they have ceased to be whatever they were before. Now, I don't allow some things in my category. For example, an excited woman in my class said she thought she knew what I wanted and brought me a photograph of a lamp base made out of the inside of a washing machine. Well, just forget it; she gets an A for effort, and it couldn't have been a sweeter gesture, but I am talking about something better than that, speaking of taste. On the other hand, I will allow this one. I came across some ice cream cones on the front of a sweet shop on

Atlantic Avenue in 1946. I kept thinking there is something odd about those ice cream cones. They were about fourteen feet high. Every day I kept looking at them. Finally, it dawned on me that the war was over and those were pontoons, just up-ended and painted with a pink top and that little basket pattern that ice cream cones have. Someone made a fair use of a stockpile of pontoons. I count that not because it is useful, but because there was an inherent quality in pontoonship that fits into ice cream cone shapes. Another demonstration: My father's office was in the industrial part of town where there had been a gravel pit. After a certain number of cars had gone over the edge of Washington Boulevard into the pit, someone suggested the kind of fence that would corrugate a car rather than let it over the cliff. So they collected iron hot water heaters. No longer does anyone have a hot water heater that admits to being a hot water heater. Today, they are consoles or somesuch. But, in the old days, a hot water heater was a cylinder with a bunch of buttons down it--rivets. (Today, if you take the outside off your heater, there will be one like that inside.) They disembowelled the heaters and sunk them along the edge of the gravel pit. Then they threaded off the caps, filled the tanks with sand, and painted them with aluminum paint. No one ever went over that bank again. Of course, there were a lot of pretty short cars, but they never went over the bank again. That fence to my knowledge has been there since 1925. I can recall it since 1925, but how much earlier than that it was there, I don't know. UCLA's parking lot is much more modern, it uses acetylene tanks for parking lot barriers.

In any farm or harbor area, people use things over again, giving them a second life. Bumpers on the little tug boats on the bay here are simply great. There are two kinds, life-saver tires lined all along the side of the boat, and prow tires, split open, flattened and brought around like bars on which to write music. There was a Columbia River tug boat, a very large one, in Newport one year. One of my children was working on it so I went down to see how it was getting along. It had the most beautiful bumpers on the front, made of immense earth moving equipment tires with a rattlesnakey pattern. Well, of course, the rubber tire company tried to convince the boat people that their solution was really nonsense and that they could make better bumpers cheaper than the boat people could salvage. The boat people say, "Yes, yes--you are right" and go right on salvaging tires, because they have already a man on the job anyway, and they don't have eight hours a day work for him, so he works in between fixing up bumpers.

Well, there are things that live twice in a variety of ways. You have seen fences made out of cable spools. Feeders for animals in middle western farms are made by slicing a tire in half and dropping it down over a post. Presto! A circular trough. One of the most beautiful fences I ever saw anywhere was made of thrashing beds, no longer good for thrashing, but very good as barriers.

I can point out to you almost as fast as you can to me that economically this stuff doesn't really make much sense; it is very personal in a time when things are not very personal; it has a very limited application in a time when application has to be general to be practical; and the likelihood is that it really isn't cheaper than something designed for the purpose. But I think it says something about people. People don't like things to be plowed under constantly unless, in being plowed under, they are going to grow up again. They don't like things to be purchased and not given full use. Something ought to have disintegrated completely before labelled DISCARD.

As you get older in life, you have stronger feelings about this problem because it gets closer to you. Discard is the order of the day and once more as Cage says, "Let the old ones go. There isn't anything that can be done for them."

I believe, of course, that this idea of conserving an item comes from the past when we were taught frugality as a Christian virtue--probably some other kind of virtue, too, but it was thought of as a Christian virtue. Currently, I believe there is a kind of under-current of resentment of wasteful circularity, a waste of more than anything else the talents that go into design and production. Never mind about the rubber and the sulphur and all the elements or chemicals or raw materials whatever you want to call them, that go into making something. Industry and talent are wasted.

Supplement to an earlier talk:
I think I can show you what I was trying to get at initially this afternoon by going back to Dr. Byers example when he was telling how many address labels could be printed on a new machine. He said that if you have a subscription to Life or Time, the address label in the corner is printed by this process. Now, I would like to know how to get my name off that machine. After I had some glimmering of how the machine operates, I saw that getting one's name off of it would be an extremely difficult thing. What is hard, is not printing, but erasing. And I believe this goes with the problem of redundancy. Have you ever tried to get your name off a list? If you can get it off in six months, you are doing very, very well. One attack worked for me for a while; I wrote 'deceased' on the mailing piece and sent it back. I was teasing, of course, when I said that they don't know how to get your name off. I do know that they know how, but it is very hard to get them to do it because it costs more to take your name off.

Also, if for the first time you subscribe under your husband's name, but for some reason or other you sign your checks a different way, when you send in your check, by George, you are on the list twice. Then, if they happen to take the address off the return on your envelope (you have your name down slightly different again-perhaps just your initials), you are on there three times! Then, of course, they sell the list to someone else so you are on that list. A good many years ago, one of our children collected stamps. Finally, he discovered--something that I would not have noticed--that all of the stamp companies he wrote to addressed him in exactly the same way and had exactly the same line of type on the address label. He put two and two together and got eight stamp companies. So he collected labels from all of them and sent each of them a very careful letter which said, "I am no longer a child, but about to enter college and give up childish things. Will you please take me off your approvals list." (You know what approvals lists are; if you don't, you weren't a boy stamp collector) The next thing you know, here came a package full of approvals. My little boy had gone off to college by this time, and so I did what I had just heard the radio tell me to do; that is, I sent a letter back saying, "We neither pay for, nor return unsolicited merchandise." It took me almost two years to get off that list. I was just following advice from an official source. This is neither here nor there, except to say that concern for getting address labels printed rapidly seems to take precedence over concern for whether or not to have the label printed. It is like being a school teacher in a houseful of school teachers and having subscriptions to the school teachers journals. In our house, we get four or five a month. Now, you can read the school teachers' journal only once.

At the risk of sounding or being unprofessional, I would say I read it more out of duty or for lack of something else to read than out of any really great emotional involvement in that publication. It is even harder for me to face when I get five copies a month. And the machinery to deal with mailed out duplication of materials designed to change the customer's mind is even further behind, at least in application. We get six or eight opportunities to buy books in the advanced sale, hosiery by the dozen, sharkskin slacks, and ten per cent off on detergent.

I want to add to the list of things that try to have a second life. One of my teachers brought me a photograph of an Indian graveyard in Wyoming, not far from Cody. Iron beds are placed on the graveyard over graves of a husband and wife. The head of the iron bed at one end and the foot at the other so that they are in a sense in bed in the meadow. I would like to know the explanation, but I would really like another clearer picture.

The people who work in the field of fish and game in California, off the coast of Florida, and along some rivers, put car bodies down in the water for fish to find shelter. Off the coast of the town adjacent to us, Redondo Beach, there is a kind of condominium for fish. We have had a long problem with public transportation in Los Angeles. There were at one time subways and street car service throughout the county of Los Angeles. However, as nice people don't ride street cars, they tore up all the tracks. Then they had all the street cars left. So the fish and game people bought the streetcars and lowered them into the sea for fish to live in. I believe that the man who arranged them must be from South Dakota, because the cars are all lined up so you could name the streets. They are just as neatly parallel to each other--Main St., Hill St., Grand and Euclid, etc. Fish have had a great time in them. The fish and game people took out all the windows so there is free access. Recently the young man who owns the Dive "N" Surf wanted to have his own special way to trap lobsters, a distinctive way that would do a better job than other people's. He had a friend who manufactured plumbing equipment. (I hesitate to tell you this, but it is absolutely true.) Not all pieces of plumbing come out in perfect form. Seconds that are not good for toilets, for example, would be great for lobsters. So Dive 'N' Surf at Redondo Beach has, I believe, over one hundred of these addressed and set in the bottom of the sea. They make very nice track housing for lobsters. The development will last a long, long time, because it is not subject to the in-roads of moisture and rust and so forth. Car bodies disintegrate and ultimately return to nature.

Man's inclination to solve problems doesn't necessarily mean that the problems he faces are the ones he works on. Did women invent washing machines? I am sure that that is not true. I don't even believe that women invented improvements on washing machines. Don't ask women what ought to be done to washing machines; they are the last people in the world to ask. It is the people who are not doing the washing, people who are sitting and thinking about it, that solve the problem. On a larger scale, I believe that problem-solving is a kind of gymnastics that poeple like and do for the fun of solving the problem as much as for solving a problem. I believe also that problem-solvers work into two areas. There is the problem of getting hold of or producing a can opener that will really work. (No device has had more patents taken out on it than the can opener.) Now the other end of that problem is to figure out how not to need a can opener. So the problem is solved from two ends.

One end is to eliminate the need for the thing for which you are trying to design a better one; the other is to design the better one. It isn't just can openers, can openers are merely easy to point out. We try to figure out ways to make it easier to keep clothes clean: Better washing machines, better ironing machines, ways to look chic and freshly starched. All the time we are working out better equipment for doing this job we are working out ways of not needing the job done. Things that are permanently pressed, don't shrink, don't fade, don't require ironing and have life-time pleats, are disposable or can be rented. These are superficial examples, but I believe they are clear demonstrations. The classic example is the stove. My neighbor's stove (this is a really true neighbor) will do everything, but she doesn't believe it. She can go away and come home eight hours later and the dinner will be ready to take out. She has never once used the device because she doesn't believe it. You think that she is unique? Check around. Let me tell you, your wife doesn't believe all these devices on her stove. The stove will tell you the temperature of the middle of the roast. It will ring a bell when it is time to turn off; it will turn things around; it will boil for so long and then cut the temperature down. It will start the coffee pot or the roast. Finally, the surface of kettles is so improved so that food won't stick. The husband comes home and she says, "Well, why don't we eat out or let's have whoever it is down the line that sends it in--send in the supper all cooked." You know, most children don't have any idea that chickens have only two legs! We have better refrigeration, better cooking devices, better laundering devices, and then concurrently we have all kinds of ways of not needing all of these things. You can eat out any night. You don't have to cook at all, you don't have to have a recipe. Here is one area, one of the few areas, I can think of in which exclusivity has had real meaning until recently. I do believe that there used to be recipes that people didn't tell other people. Apropos of our conversation about the distinction between cheating and sharing. In any other area, people are dying to share. You don't sneak into the neighbor's tool shed to find out what he uses on his lawn; you ask him. In general, you ask people what their recipes are, but certain recipes used to be privy. There was a time when people regarded this one as Aunt Julia's pound cake recipe. But there is no longer any of that. The closest you can come to a recipe is to make it from "scratch." And the idea of food made from scratch appalls me because I was raised in the days when you fed the chickens scratch. The advertisements ask, "Did you make this cake from scratch?"

There is better and better equipment; there are more and more prepared, convenience foods. In fact, it is really more convenient to eat than it is a pleasure. That is particularly true of institutional food. I am sure it is nourishing and is, of course, convenient, but it is not food in the old-fashioned sense.

We are off to one side of the subject, but I want to say once more that the problem solving is done first for entertainment as much as for solving problems, and generally, problems are solved from both ends working toward the middle and rarely in terms of ramifications. The result is that when the problem solvers have finally figured out a stove that will do everything the lady would like, she no longer has to make cakes or bread out of scratch. She can get home-made bread mailed to her; at least, in my town she can--"home-made" bread already baked and ready to go in the mail.

The area in which this annulment is most obvious is that of home equipment. Two other cancel-out problem-solving activities are, of course, cars and freeways. Figure out how to go faster on it and then buy more freeways for things to go faster on. Finally, there are so many crowded freeways there isn't any place left to go. In Los Angeles, it is just about that way now. Freeways use up so much space and so much access area that this is not just a joke; it is a serious threat.

A few minutes ago, someone told me her favorite sign was on a trestle that ended a railroad. On the trestle someone had painted, "Well, goodbye and good luck." We have such a freeway in Los Angeles. It doesn't go anywhere at all. It starts at Terminal Island and goes out to Willow Avenue. When you leave it, you can go either way on Willow, but Willow dead-ends west and goes nowhere special east. You might want to go to Terminal Island, but there is a better way to get there. This freeway was built so that war-workers could get to their work in a hurry; it was still under construction when the war ended. But it was a solution to a problem, the problem of trying to solve a problem.

So now, if I can summarize this: I believe we need to consider something other than the answer. I am afraid of answers because we tend, as I said earlier, to use any new idea or new-to-us idea in terms of the idea or tool, or device, or implement or invention that it replaced. Thus, we hold back innovation by looking backwards. You can't look forward because you haven't been there yet, unless you have a sense of innovation or intuition. I suggest that people like those in the printing, the household equipment, and transportation industries ought to begin to consider the country's problems--problems they create by not considering what is going to happen to what they have been producing once it ceases to fulfill its original function. I don't know the answer and that is why I play this game of the second life because many things do have a second life.

And speaking about their second life, we could work out something to get rid of this plethora. One day it occurred to me that the people who create the problem ought to be faced with having to pay for it. To go back a notch, we had a young friend in the state legislature about the time a lobbyist named Samish was active in California. Our friend explained that lobbying is not as dangerous as you might think because most lobbying, too, cancels itself out. He gave the example of the beer can and the no-return bottle. The beer can people couldn't compete with the no-return bottle people, so they wanted the state legislature to make no-return bottles illegal. The beer can people gave as their reasons that no-return bottles are messy, dirty, and are dangerous--they might explode. In the meantime, the bottle lobby claimed that cans had an unfair economic advantage over returnable bottles. As a consequence, the legislator was really free of any obligations to either of them so he could decide this thing on merit alone. If he was unfortunate enough to have a little boy cut his foot at the beach on a bottle that someone had dumped off a fishing barge, then, of course, he was on the side of beer cans. There are many externals that influence judgment. So the legislator met with the political club in our town. Half of us were down at the beach every day with a lawn rake cleaning the beach so our children could go swimming. We had had enough of beer cans and bottles, so we said to him, "Why don't you have a law that charges the no-return bottle industry and the beer can industry and the throw-away newspaper industry and the cigarette and gumwrapper industry.

Why don't you charge them for cleaning up the mess that is going to happen as a result of the profitable business they are in. Of course, this idea was totally impractical and treated as a joke.

I am not talking about the kind of simple house-keeping that goes with roadside litter cans and the $199.00 fines. When we first started driving to Aspen, we went through miles of cans and bottles and papers in California. In Arizona and Colorado, there wouldn't be a can in sight. We would see no billboards from one end of the state to the other except on the way into Las Vegas which we had to go through to get to Colorado. In the ten or twelve years since we first started the annual trek to Aspen, you would not know the roadside in California--so clean and can free. I believe the change has something to do with conscience rather than the $199.00 fine, because I am sure there is a way of throwing cans on the highway without being caught. Today a can on the highway is conspicuous because there are so few. Bolsa Chica in Southern California used to be known as Tin-Can Beach. Today it is glossy white and clean.

I wish I could say as much for the billboard situation. The billboards have begun to reduce in California in a funny way. The state and the local governments share in the cost of landscaping the freeway. The state doesn't put any effort into the project until the local community has a law about billboards in relation to the freeway. Most municipalities are so anxious to get some of the state money that they are willing to have a billboard law in order to get money to landscape the freeway. Thus, through a kind of a slice from the side, we have cut down on billboards on freeways. (Speaking of lobbies, the billboard lobby has a man who does nothing but prove that billboards do not cause accidents. He lobbies and works and checks on lawsuits to be sure that no billboard ever caused an accident or more precisely ever got the blame for causing an accident.)

In the meantime, that kind of housekeeping which I think is important does not refer to the man who throws a can out of his car or drops the cigarette package along the sidewalk. That is a personal thing and important, but not what I am talking about. I am talking about the open pit graveyard for cars, for example. I am thinking of a street near my town where there are all kinds of old washing machines, dryers, dishwashers. (Somewhere between here and California there is a snowfence made of car bodies. I am sure it works and it is a better use for the car body than having it sit in a lot.)

I suggest that we should be considering what to do. In the first place, plethora carries other responsibilities with it. It reduces the value of things. We are no longer Lincolns, writing on shovels or walking five miles to get a book. The only book I can think of that moved people much of late years is Catcher in the Rye. Any adolescent five years ago talked about Holden Caulfield as if they were alive and lived nearby. People my grandmonther's age read Dickens from month to month in serial form--the people in Dickens were alive to them. They spoke of them as if they knew them, they quoted from this stuff so much that their speech was actually modified by Dickens. If you have read any amount of Dickens, you know it is pretty hard these days to get that involved because we have a lot more demanding communications, a lot more powerful visual environment than that of the nineteenth century. The vitality of the printed word has dissipated because we have so much of it. There is a science-fiction story based on the assumption that the richer you are, the less you are obliged to consume. The lower you are on the economic scale, the more you have to consume. People at the foot of the economic scale are constantly trying to use stuff up, but rich people don't have to use up stuff. We are, I believe, in a time when we have got to figure out a means not to be inundated by what we produce. I am not even talking about the protection of our resources or the squandering of our children's heritage which is outside my field. I have a view about that, but I don't believe it is pertinent to this discussion. At Aspen, Maldonado said that we live in an environment of "incredible visual intensity." We finally have to not see what is around us, to not read what is printed and before us, to not actually look at the pictures in the magazines. In the beginning, the picture magazine was for the people who couldn't read. Now it is the people who can't even look at pictures--I don't mean 'can't' literally so much as can't take time to. I believe I told you that some years ago a woman called me and said, "My little boy can't read. Yours can read. I need your help." I said, "Well, I am busy this week with finals, but I have a book I will lend you. I'll drop it by your house." She said, "Don't lend it to me, tell me what it says." And that is where we are today--we need someone to tell us what is going on.

You can get through life today if you know how to read eight or ten words. Further, people may never find out that you don't know how to read any other words. Of course, those words all have to be in upper case, although the rest of us are taught to read in lower case. But, if someone taught you those same ten upper case words, you could get through this world of "incredible visual intensity" and you probably would not have some of the pains that the rest of us readers have. The words? Stop, Go, Walk, Wait, Men, Women, Exit, Entrance, etc. Essentially, the function of reading and writing has changed. My friend tries to teach the profoundly handicapped to read the ten words I mentioned; reading is something else for them than for you and me. The broader the base of reading, the more its function moves over from its initial function. Literacy is a great leveler. This is in a way saying that everything kills itself. Example: Let us say that you manufacture an exclusive shirt for men. If you are at all successful, the thing you are marketing is failure, because as soon as everyone owns one it is no longer exclusive. If everyone knows the answer to the question on your test, there is no point in correcting that question.

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The thing that keeps us from acting is that, although time and change are extremely rapid, we gear our thinking about time and change by equating them with how much time we personally have to effect change or have left to see change. We figure that we have not much to do with this flow so we don't involve ourselves directly with it.

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After saying people have a right to be whole, to perceive directly and not to be inundated, I still have no notion as to how to protect these rights. Within my lifetime, encroachments are steadily more and more formidable. I do know that the identification of almost any trend or movement tends to modify it--and that seems to me to be a hopeful sign. The population in this country is still growing, but the birthrate is not at the same pace it was ten years ago, and certainly not at the pace it was five years ago. It seems to me that identifying something as being the case tends to keep it from continuing to be the case, or causes people to work on solutions. I know that we can't, out of self-defense, pay much attention to the avalanche of words that come to us but

but we should recognize it as an avalanche.

I have a friend who taught in a small private school which prepares students to enter one of the ivy league colleges. To be accepted at this school, a student had to be in the ninety-nine percentile of high school students. In addition, the tuition was huge except that no student paid it; all were admitted on grants. Well, the teachers perpetrated certain invasions on the students which I regard both unfair and comical. The youngsters insisted that they couldn't study without noise. They were not merely accustomed to noise; that they had to have it. So music was piped to their rooms. They were not particularly choosey about the kind of music, and were perfectly willing to put up with faculty choices, if there was a balanced trade-off with their own. The language teacher got a bang out of throwing in certain music which she calls "classical." (I figure that classical music has been around a certain length of time and that you don't have to give it any more definition than that.) She would play for them the same music over and over and over again, but never at the beginning of the study time. Later on, the students were asked to identify the "classical" music--no one recognized any of it--they drew an absolute blank. They had heard the noise, but not the music. I believe that is where we are; we hear the noise but not the music. If you have ever been in a very, very noisy place like a closed-in public plunge with a lot of people and a lot of hard surfaces, when you come out the silence is noisy. The silence of leaving a noisy place is noisy. The human mechanism is such that it screens out defensively--both an advantage and a disadvantage.

Almost anything we attempt works towards its own destruction. We invent printing and then get so much printing that it is almost impossible for people to have a common background. A good many years ago, I went to hear Mortimer Adler. Adler was then very, very distressed because if you put any ten people with a liberal arts degree from the University of Chicago together, no two of the ten had read the same books. If he is still thinking about this situation, he must be a nervous wreck. The problem is worse if it _is_ a problem. I see the situation as more extreme now but not necessarily better or worse than it was then. It gets more extreme all the time. If you produce a best seller, your readers will comprise only a small percentage of the total number of possible readers. The eighteenth century meaning of reading is lost; a voting majority is not a consensus today. And when you figure that out, it is an example of change in situation without a change in operations. I do not present a plea, only an example, a topic for concerned investigation.

The Bible was translated into English at a very fortunate time. The people who translated it were scholarly in an uncommon way and their position was that since the Bible was going to be used by people who could not read, it should be translated into spoken English. So the official translation of consequence, King James version, was translated into spoken English. The Bible was _used_. A literate member of the family read it aloud every day in most English-speaking families. The result was such a prominent influence on speech patterns that diaries and notebooks, accounts, and ship's logs and everything carry this overtone of Biblical sentence structure. Additionally, nice, easy going, simple four and five letter words, were kept alive in the language and the oral and written tradition has some kind of force that other European languages do not have. If you have not read Slocum's _Sailing Around the World_, please do read it. Joshua Slocum didn't belong to any writing club, wasn't scholarly, hadn't had any courses in expository writing. He had simply been exposed to a certain caliber of writing which was literally spoken English in print. Sailing Around the World Alone has an impact, even today. Now, today we have so many forces, so many kinds of English and so much perversion of the language, so much duplication, so much of what I am doing now--redundancy, that it is astounding to me that we get anything across at all. Really, the most communicative things we can think of are situations in which there are no words. That is one of the things I hoped would show up on the collection of "friendship" and "love" and it does show up.

# GRAPHIC COMMUNICATION AND THE GRAPHIC DESIGNER

### by BILL TARA

Bill Tara is a cartoonist, illustrator, designer, art director, and advertising consultant, primarily as a free-lance working out of his own studio in Los Angeles. He has served as President of Society of Illustrators of Los Angeles, President of International Design Conference at Aspen, and is a member of the Board of Governors, Art Directors Club of Los Angeles. Tara has received awards for illustration and advertising design from the Art Directors Clubs in several cities. He has had articles published in various magazines including Graphis, Art Directors Annuals, CA Magazine, and, most recently, "The Graphic Traveler in Eastern Europe," CA Magazine, February 1966.

## THE GRAPHIC DESIGNER

The graphic designer, though he might desire to be called something else, is a Commercial Artist doing commercial art. He is likely to be involved in some sort of selling and so may be frequently involved in intrusive acts. The term "Graphic Designer" is a relatively recent one which describes, not very properly, a person who interprets, organizes, arranges, and embellishes information in some graphic form. The term is often applied rather loosely for no requirements have been established which limit its application. The newspaper editor who arranges the information for the front page, determining the length and position of the stories, selecting the kind and character of the type and picking the photographs to be used, might, if he wished, designate himself a "Graphic Designer." So might a painter of signs or the junior high student who designs the mimeographed announcement for a school picnic.

The artist who has designed the surfaces of a toothpaste box has produced a graphic design and so has the architect who, having determined the characteristics of a large-scale box to contain people, embellishes its surfaces with form and color. The maker of stained-glass windows for churches, patterns for the surfaces of cloth and arrangements of decoration on the surfaces of automobiles is a "Graphic Designer." And so is the artist who translates the information for an aspirin TV commercial into a graphic form. The man who paints "God is Love" on rocks might reasonably claim to be a "Graphic Designer" for he has produced graphic designs. But it is not likely that he has been paid for his labors. Nor will he be, directly. His reward may come, if it does, posthumously. So it is likely that he belongs to the field of the fine rather than the commercial arts. He works at the edge of the field as do the painters of pictures for motel walls whose work may be loosely classified with his, for both are graphic designs of a sort. The rock painter's work, however, contains a message which he has interpreted, organized, arranged, and embellished. His work contains information while the motel wall picture-painter's product contains almost none. This important distinction would permit, though the membership committee would be more than a little nervous about it, the rock painter's admission to the Graphic Designer's Club, if there were one.

What the graphic designer is primarily concerned with is information in graphic form. The information may be important or unimportant. It may be simple, like "No Smoking," or complex like "The History and Development of the Internal Combustion Engine." The information which the graphic designer must translate into graphics will be transmitted with the express hope that the receivers will not only perceive the message, but will respond; they will do something or not do something; they will learn something or unlearn something or they will buy, sell, go or no go.

The designer of a pilot's handbook reveals information graphically. The designer of women's clothing graphically conceals information, though Rudi Gernreich became indirectly involved in information-revealment with his topless swim suit. The designer of an annual report of a corporation may be required to both reveal and conceal information. The designer of an advertisement may reveal, conceal, and distort. And a graphic designer may, unconsciously, or in a fit of artistic passion, conceal or distort information that was meant to be revealed quite clearly.

Though the term "Graphic Designer" is a relatively recent one, the function he performs is not new. The weavers of rugs, especially prayer rugs where meaning was designed and woven into the fabric, were graphic designers. So were the monks who painstakingly hand-lettered and illustrated books before Gutenberg began designing with moveable type.

It was not until late in the Industrial Revolution that graphic artists became involved in commerce though they had traveled its fringes, painting signs, decorating and ornamenting commercial places and things. And artists developed their own commerce, doing portraits, religious pictures and bushwhacking about doing silhouettes with nail scissors.

The term "Graphic Designer" came into limited useage with the "Great Graphic Explosion" which came along with the "Great Information Explosion" and the "Great Advertising Explosion." There were really no explosions at all, except in the compressed time of the historian. There was no sudden involvement of the artist in commerce. He simply followed the paths of commerce and not always with fierce enthusiasm.

When photo engraving replaced the laborious method of handcutting drawings and designs in metal and wood, more art was used in printing and as commerce expended, more opportunities for the commercial artist existed. In the early days of advertising, the commercial artist likely produced the finished ad himself, layout, lettering and illustration, ready for the photo engraver and the press. Commerce expanded further and the commercial artist became more specialized. There evolved separate categories: Lettering men, Layout men, Illustrators, Cartoonists. Illustrators were sub-categorized into their specializations: Medical, Technical, Figure, Product, Humorous, Decorative and just plain Illustrator. Photo-retouchers removed blemishes and Paste-up men performed the function of rubber-cementing together the type proofs and the products of the various specialists in preparation for reproduction. And, naturally enough, to direct and organize the labors of these many specialists, came the Art

Director, the Assistant Art Director, and, in some larger establishments, a specialist whose sole function was to buy art. He was, reasonably enough, titled Art Buyer. Production men supervised the mechanics of reproduction. In general, the Art Director, Art Buyer, and Production man are members of organizations, employees of printing, publishing, advertising, and in some cases, manufacturing concerns. The rest of the specialists may work independently as "free lancers" or in groups of various sizes, performing their services on a contractual basis as needed. The graphics of advertising are produced in this manner.

The Los Angeles Telephone Directory lists more than three hundred Commercial Artists. It lists under twenty Graphic Designers. Only a few are cross-listed. Mario Zamparelli lists only as a Graphic Designer, Saul Bass lists only as a Commercial Artist. Al Freeman Signs and Show Cards lists under Fine Artists as does Roth the Crazy Painter. Some cynics might conclude that because the information is from the Los Angeles Telephone Directory, it may be whimsical and it may, indeed. But the fact is that there are no established standards whereby a Graphic Designer may be clearly differentiated from a plain old Commercial Artist. And anyone who interprets, organizes, arranges and embellishes information, however wittily, may lay his hand on a rock, look up at the sky and declare himself, henceforth and forever, a Graphic Designer.

The need of the artist to communicate with the world, to relate, to reach, and somehow touch, is not unique. This is everyone's need and hope. What is unique is the manner in which he does it, or tries.

The artist makes pictures in a world of words. He attempts to speak his thoughts in pictures, to communicate his feelings in graphic form. Words, spoken ones, do not come easy to him. Or, not as easily in my observation, as they do to others. I recall few artists on debating teams in schools. I recall none who were class officers. Only one artist that I remember in the large high school that I attended even made appearances before audiences. He was a cheer leader and used few words other than, "All right, gang, let's give a locomotive for...." The rest was graphic.

He bothered me then, and still does, for he failed to conform to the pattern into which most artists I know fit. He managed a kind of extroversion uncommon to the others. He succeeded in dispersing a considerable amount of energy in this not unhealthy way that might have been applied to his art in which he has enjoyed a limited success. The more successful artists I know could not have accomplished that little bit of extrovertism. They are a shy lot.

An article in your local paper yesterday commented that there were few artists in Rotary. I would be surprised to find any, for words are the principal medium for communication at Rotary, not pictures. Salesmen would be there, not artists. And, it has been my observation that a salesman is something that the artist is generally not. Certainly not a "Hooboy, put-it-there-pal-slap-on-the-back-buddy" fellow.

A seller-of-goods, a vigorous vendor he is not. He is more inclined to be introverted, his foot is not the one you might find in your door. His hand is likely to slip moistly on the doorknob. His methods of communication are not direct, his method of selling may even be devious. Salvadore Dali is something of an exception, perhaps, but then, Salvadore is only selling the pictures of Dali. I would hesitate to send him out on a Fuller Brush route, even if he would go. He would probably botch it up thoroughly.

Dali does not exactly sell Dali, he uses a Dali that he has invented to sell Dali's paintings. He uses his invented Dali to attract and interest people to his paintings and he presents this Dali as an almost "graphic thing." The mustaches, the facial expressions, the ants in the eye-glasses and the complex photographic images of Dali that he creates are graphics employed to accomplish his purpose. Cunningly, wittily, deviously, indirectly and graphically, Dali Sells. Like crazy.

It is probable, I believe, that if his pictures produced the response he hopes for, he would dispose of his manufactured Dali and retire behind his canvasses as most artists do, and attempting to communicate indirectly, through the medium of his painting, something to somebody, somewhere, sometime. And, whatever it is that he is attempting to communicate, it is his communication, his message

Rarely does the fine artist expect an immediate response from his indirect communication and rarely does he receive it. He may never know whether his graphic communication was received or if it was understood. He attempts to form a graphic communication that will attract, interest, and produce response as does the graphic designer, but his time-factor is flexible. For the message he is attempting to communicate is his own and if it is transmitted in the manner of a note in a bottle, tossed into the sea, that is his determination.

Edward Kienholz, a fine artist, accomplished something that was the envy of graphic designers everywhere. In 1966, an exhibition of his graphic constructions at the Los Angeles County Museum produced an instantaneous response. His work attracted, interested and produced response which included headlines in the Los Angeles Times for several days. He had so artfully interpreted, organized, arranged, and embellished the information of his message that response was immediate.

There appeared, however, to be some confusion as to the content of Keinholz message or whether there was any message. Clearly, something was transmitted and something received. A Mr. Warren Dorn, who had been making hopeful noises pertaining to his ambitions to be governor of California revealed only that he received something offensive. "The exhibition," he stated, "is obscene." He repeated his outraged response vigorously to the press, the County Board of Supervisors and to the museum directors. Art News received a somewhat different message; the Keinholz communication was, "to elicit the truth, to assault our moral laxity." Time magazine received a similar message: "...deeply shocking morality plays."

Mr. Dorn became so involved, apparently, in his responses to the form of the message, the manner in which it was transmitted, that the message, received by others, never reached him. Similarly, the form became the message to Dr. Max Rafferty, Superintendent of Public Education for the State of California, who, in his syndicated newspaper column, dramatized his objections to the form of transmission with insults to the artist, abuse for contemporary sculpture and painting and some acid asides for architecture. "It's all very well to dismiss this sort of criticism as 'uninformed' or 'parochial,'" Rafferty stated, "but throughout the 6,000 years of recorded history, art has always shouldered the responsibility of making itself intelligible to people like me, benighted and philistine though we be."

Art has "shouldered" no such responsibility. Nor should it. Accomplishing intelligibility is the role of communication art, not fine art. The relationship which the fine arts bear to the communication arts is similar to that of the relationship of pure science to technology; fine art is the experimental laboratory.

The graphic designer, because he is a commercial artist, gets some abuse from his blood brother, the fine artist, though the distinction between them may be fuzzy. It may be debated whether Andy Warhol or Salvadore Dali is commercial or fine.

The fine artist is not obliged, unless willing under pressure of malnutrition, to draw or paint for anybody but himself. Nor is he responsible in his work to anyone but himself, though society may insist that he should be and, at times, plead for, and even demand conformity.

The fine artist, though his ego may swell ecstatically when his work occasions applause, must be willing to forego the pleasures of instant adulation, immediate recognition of his labors. He hopes for more than a little piece of immortality, which may arrive sometime.

The fine artist need not assume responsibility for the communication of anything though he dreams that, through his work, he may reach and touch the world. Unlike the graphic designer, the fine artist must be willing to wait.

The graphic artist's time is now. He works not for himself but for a theoretical everybody. He never does anything that is not concerned with someone else: His client and his client's message, the methods of reproduction and transmission, and the response of the audience, the receivers.

The graphic designer can be painfully aware of his work responsibilities and, though he may occasionally indulge himself in the fantasy that he is an independent creator, a reminder of his responsibility and involvement is never farther away than his window where he may view a portion of the world to which he is contributing more graphic images and where there appears already to be a surfeit. Another dependable reminder is the telephone which is likely to interrupt his reverie any moment when a member of the organization with whom he is engaged will call to add, subtract, or rearrange information relevant to his graphic design. He is, whether it suits his nature, fits his fantasies or not, a member of a group, involved in a group function. And the group who pays him will protect their investment by keeping a watchful eye upon his labors and a forceful hand upon his pencil in order to guide his work, as they might describe it, safely.

The fine artist can take time to think, study, and experiment, for his time is his own. The graphic designer works always by someone else's clock. "If you plan to have a solution to my communication problem," a client once told me, "have it now."

I overheard an instructor at the Otis Art Institute in Los Angeles, Mr. Charles White, explain to a beginning class the virtues and problems of a career in art. "Art," he said, "never hurt anybody." He might have chosen a gentler word than "hurt" but the word served to make his point to his youthful audience. "Art may be painful, at times, to the artist who produces it," he continued, "because it is often painful to produce. But that pain is passed on to nobody."

He was speaking of the fine arts rather than the commercial arts and the group nodded and seemed to agree as I did. And, though I might be inclined to argue, if strongly pressed, that commercial art never really hurt anybody, either, I would also have to allow that commercial art did things that fine arts do not. Fine art does not clutter our cities, our countrysides or our mailboxes. Nor does it clutter the non-editorial pages of our newspapers and magazines. Fine art does not intrude into our lives. It is kept apart, mostly in galleries, on the walls of those who can afford it and in museums which an artist acquaintance of mine prefers to call "prisons" from which, occasionally, a little escapes.

Fine arts do not intrude; the commercial arts must.

## GRAPHIC NOISE

The graphic design signals for attention, interest and response among a profusion of other graphic signals, adding to the existing level of "graphic noise." Last year, I watched a patient lot of policemen in Titograd, Yugoslavia, as they directed the passersby to respond to the first electric traffic signals to be installed there. The pedestrians, cyclists and motorists responded with about equal resentment to this electrically controlled commanding of their behavior. The police dutifully concealed their response to the intrusion upon their previously personal authority. The sign-signal-command had replaced the previously personal relationships at the intersection.

The bazaars, where sellers personally sounded the signals to the buyers, are long gone. Signs now do the signalling. The merchant who personally extolled the merits of his merchandise directly to the customer has vanished to the backroom to manage the paperwork; the packages of goods must signal for themselves with no human help in the increasingly "self-service" society. No word need be spoken in a supermarket to abet the expenditure of a sizeable sum of money. All information is graphically communicated including the "Thank you, come again" sign on the exit door.

Within the supermarket are thousands of items graphically signalling for attention; the paint store, the liquor store, the drug store, each sending out a sign-signal adding to the level of graphic noise.

The graphic noise in an uncontrolled environment rises steadily. Progressively, each new sign-signal, brighter and bolder, adds to the visual confusion. Necessary information, "stop-go-walk-fire-police-danger," is mixed with unnecessary information. Mercifully, as the graphic noise level increases, the total may blend to become a blur as meaningless as the words of a crowd at a cocktail party.

In controlled environments, the fenced factory, a school or Williamsburg, Virginia, the graphic designer deals with a low-level of graphic noise to which he will add something. For the circumstance is rare where he is called upon to remove something. To the market shelves, the newsstands and the racks of phonograph recordings, he will assist in adding more graphic noise in the graphic competition for attention.

Within the confines of a mass periodical publication, where the advertising usually exceeds the editorial content, the designer of commercial messages cannot control environment. Relatively vital information is mixed with the non-vital from page to page. Into the editorial environment the designer must intrude, competing graphically for attention.

The graphic designer is more likely to be involved in the communication of non-vital information, in an uncontrolled, and probably uncontrollable environment. He will add, rather than subtract graphic noise. The graphic designer, if not an intruder, is, most often, involved in an intrusion.

Several years ago, when billboard companies were defending themselves against critics who abused them for intruding upon the landscape, they offered a number of thin defenses out of a growing fear that the criticism might "break their rice bowl." Perhaps their most specious argument was the one proclaiming that, "people liked billboards." My response to this was a plan to provide special parks just off the highway where "billboard lovers" might gather for delightful outings among the billboard plantings. Thus far, the "Billboard Park" idea has not caught on.

Nor has the idea, quite seriously proposed by a noted landscape architect, that billboards be designed to "blend with the landscape." And it will not. For billboards, like any form of advertising must not blend. They must be seen, regardless of the intrusion. Regardless of the worthiness of their purpose, they must be designed to attract, to be graphically active, not passive.

The graphic designer's role, in the absence of graphic competition, might be simply to bring beauty to form and clarity to content. But, the circumstance is rare when his graphic design, whether it be a sign, an advertisement, a publication or a package, will exist in an environment free of graphic noise.

Should I cause black text to be printed upon black paper, I have, using the broadcast analogy, produced interference, graphic noise within the message which inhibits reading. The same is true if I decorate the message with extraneous ornamentation. For, I have added to the graphic noise going on in the channels of transmission, I know that if cold words are put into cold type, the effect can be chilling and that whenever I can succeed in getting some human kind of warmth into a communication, my chances of success improve. And when everybody is running quaint pictures of cute puppy dogs, I better not. When my graphic competition zigs, I had best zag, whether I am designing a poster for a school bulletin board, a TV ad or an announcement for a cemetery.

I must remember that nobody, except the man who asked me to design a communication, may really want the communication or will be in an especially eager mood to receive it. I consider myself, while in the act of designing a communication, to be an intruder and I have favored the method of attempting to charm the audience in preference to beating them about the head for I am generally involved in attempting, through graphic communication, to get someone to do something non-vital to their existence, things like, "Come to the Party," "Drink Big Orange," or "Vacation at Scroon Lake." Though I doubt the necessity of attempting to bring human warmth to the design of a sign stating, "Explosives, No Smoking," I might think on whether the importance of the message might be enhanced with some embellishment beyond the clear expression of the words. Chances are it would not.

A lecturer has the opportunity, if he looks up occasionally from his text, or if he has seeded his remarks with some hopefully laugh-producing material, to determine whether anybody is paying attention. A simple survey of the number of eyes that are open may indicate who might be attending to his remarks. There is no guarantee, however, that the open eyes will indicate anything more than the possibility that the brain might be turned on.

The teacher can demand that the obvious impediments to attention, the distractions of real noise, can be kept minimal. The teacher can also demand a posture of attention and can determine, roughly, whether the communication which is being issued stands a chance of being received. The teacher can determine through the feedback of answers whether the group is tuned in to her questions.

No such opportunity exists directly for the graphic designer. Only in the rarest circumstances can he determine directly whether anyone responds to the communication he has designed or even if anyone was even there to respond.

If the graphic designer has produced a communication designed to make someone buy something, he might conclude that if his audience did what was expected of them, his efforts were a success. With small audiences and simple circumstances, it is possible, occasionally, to make such a determination. With great audiences it becomes nearly impossible.

While we think of TV as an instantaneous communication medium, the increasing use of filmed and taped material has lessened the amount of live programming considerably. The time-lag between preparation of information and transmission, excluding news, special events, and sports, may be days, weeks, or months. The preparation of advertising material takes a like amount of time. Even "Honest Harry the Used Car King" may be obliged to tape his commercials in advance rather than deliver them live as he once did. Feedback, the response to his communication is slowed.

Newspapers, due to the time necessary for production, printing, and distribution, have a greater time-lag between transmission and reception than TV. But, in practice, the time-factor is nearly the same for both mediums as far as advertising is concerned.

Person-to-person communications receive almost instantaneous response. The introduction of any device between the persons produces a delay in feedback response. It may, in the case of monthly magazine transmission, take months for the circuit to function.

Radio, with the introduction of the telephone-talk shows, has reduced transmission-reception-feedback time to a few seconds, just enough delay in-built to be able to censor objectionable words. Should the picture-telephone come into general usage, TV will offer similar programming.

The graphic designer's involvement in communication is limited by the time-factor. He will be employed more in the slower communication mediums where there is time to permit him to function and where, correspondingly, feedback response will be slow, if it comes at all.

The graphic designer may react to the slow, or no-feedback response in several ways. He may say, in effect, "To hell with it," and amuse himself by applying to the communications any graphic frivolity that pops into his head, defending them to his client with some clever, mystical rational. He may, instead, abandon the direction of his labors to his clients and become a "good graphic boy," cheerfully obedient. Or, he may struggle in the vacuum of feedback and apply himself to the study of audience response, psychology and the behavioral sciences.

He will study semantics and supermarkets. He will examine what is being done graphically in Life, McCalls, Playboy, and Mad magazines and watch Graphis and CA for selected examples of current graphics. He will observe what is occurring in the fine arts and keep an eye upon the greeting-card racks and learn what people are purchasing as person-to-person graphic communications, in numbers upwards of five billion cards per year. He will do what Ruth Galanoplos wrote in the Saturday Review (December 10, 1966), "At one large greeting-card firm, writers work in an atmosphere of 'planned cretivity,' gathering inspiration from old-time Keaton, Chaplin, and Fields movies, pop-art posters, field trips to museums and art galleries...."

The graphic designer can be no less knowledgeable than the writer "....about such contemporary cultural phenomena as Batman, and the Beatles, mini-skirts and Marat/Sade, the Cheetah and the Great Society."

The graphic designer better know "what's happening" along with "what happened." And he will do well to remember that the time-lag between the forming of a message and its reception makes "what's happening" history. Batman lasted quite a while during his first life, his reincarnation will last but briefly. The time duration of fads grows shorter. If there is a rule to guide the graphic designer in the matter of fads and fashions, it is this: If it's new, it's already old.

This applies to graphic fads as well. The witty designer keeps himself well-aware of them and clear of them as well, for he recognizes that the pursuit of what is graphically au courant can be exhausting, frequently pointless and often an end in itself.

He will have his head and hands quite full attempting to achieve a communication which will: (1) ATTRACT, (2) INTEREST, and (3) produce RESPONSE. His design will, of competitive necessity, produce some graphic noise. Hopefully, he will add only what is absolutely necessary and exclude the little graphic giggles of fashion.

## TRUTH AND BEAUTY

Truth and beauty is what the graphic designer may bring to the world, but it will likely not be his own.

The graphic designer, his pencil poised to begin a graphic design, is about to become involved in TRUTH AND BEAUTY AND THE WORLD. He is about to create. Out of his imagination, his intellect, and through his skills a message is about to be formed.

If his pencil quivers as he brings it toward the paper, it is likely not a consequence of a creative ectasy, though he may permit himself a split-second of dizzy deception as to the nature of the act he is about to perform. He is about to bring something to the world through the medium of his talent, but it may not be his world, his beauty or his truth.

The graphic designer does not make the message, he forms it. He might be called an interpreter or a translator of information into graphic form. He does not originate messages nor does he deliver them; the truth in the message, if there happens to be any, is somebody else's. He may brilliantly clarify the message, merely assemble it neatly or adorn it with extravagant embellishments.

The message which the graphic designer translates into graphics may be one directed from an individual to a group, the president of a company to the stockholders, the employees, or the public. More often, the message is from a group to a group, a committee determines the message. And frequently, with large committees, the graphic designer will find that the message has not been precisely determined, or that he is obliged to translate many messages within the confines of one communication. He may find, as in the case of an annual financial report to be designed for transmission to investors, that the primary message, the financial state of the organization, is accompanied by numbers of secondary messages related to the organization's history, purpose, functions, product and ambitions. He may find that a tertiary message, involving the stroking of the proprietor's ego, may become secondary, or even primary. In a multi-page book, the various messages can be accommodated but, not infrequently, the designer may be called upon to attempt to form numbers of messages into the limited space of a publication ad. He may, with talent and some luck, succeed in bringing some kind of order to such a confusion of messages.

The graphic designer may find, in the confusion of committee, that there is no clear agreement as to the primary message or, altogether too frequently in the case of advertising, that there is no message, merely a need to communicate. The designer, in such circumstances, may contribute by aiding in determining which one of many messages is the primary one or he may help fake a message. Only then, in the role of a message inventor, does he make the message. Such truth as may be involved he may then reasonably claim as his own.

There is an understandable tendency for the graphic designer to treat the text of a message, particularly a lengthy one, as mere blocks of graphically grey matter, to be shifted about within the confines of page barriers, for the words are not his and he may be a bit timid about intruding into the non-graphic area of literary content and style. Ideally, however, his literary competence should be sufficient to permit him to analyze the form and content of the text with confidence and, consequently, to treat the message as a whole communication, in graphic form.

The comprehensibility of a communication is dependent upon the word and picture vocabulary of the audience. The graphic vocabulary may be Jackson Pollach, Grant Wood, or Donald Duck. The word vocabulary may be "Dick and Jane" or James Joyce. Residents of southeast Los Angeles comprehend both "the man's language" and "Watts." The word and picture form of Jules Feiffer is comprehended by many; Charles Shultz's "Peanuts" is comprehended by nearly all. Few dig DaDa.

The word and picture forms are determined by the audience-ability to comprehend. "But," I have heard graphic designers proclaim, having served up an ornate graphic confection, "I am helping to improve the 'esthetic standards.'" To this I can only reply, "What have you done to the message?"

The designer may do something to the message, on occasion, rather than to do something for the message; he may intrude more than a bit of himself into the message, seeking a little bit of immortality in the process. He may, imaginatively, slip himself into the role of the message maker, the originator of the message, in order to better communicate the character of the originator. Or, in the case of a large corporation whose character may be indistinct or even lacking, or he may invent the character and, creatively, play the role as he designs. The character of his invention may be wholly spurious, born of a yearning idealism as to what the character should be, or it may be a character consciously and cunningly created to mask corporate character flaws. To the unsubstantial, the graphic designer can create an appearance of substance with all the skill of a Hollywood set designer. He can erect the graphic corporate facade. Given the responsibility, the graphic designer could create the character and appearance of every thing that represents a company: The business forms, the printed matter, the packaging, the advertising, the signs and the dress of the employees. An ugly company might, with application of these graphic "corporate cosmetics," be made to appear attractive.

The graphic designer might fantasy the possibility of going even farther; scientists have proposed that the life and usefulness of the human brain might be extended by removing it from the body and providing it with a more perfect set of extensions; the graphic designer might contribute in the design of this new form. The resulting form might be an entirely new one or a perfection of the standard human form. Or, perhaps, something in between like the blobs which populate the architect's renderings. The designer might, influenced by the "beautiful people" in advertising photographs, create a "human form" of exquisite proportion and infinite beauty. To accomplish this, he will be obliged to determine definite esthetic standards, something which some artists and many educators have long yearned for.

The need for the setting of esthetic standards has long existed and the need has been attended to by writers, critics, teachers and, very occasionally, by artists who, for the most part, sensibly direct their critical judgments toward their own work and who, very properly, are reluctant to attempt to define "good taste" knowing that in the course of their labors, their next act may be in total defiance of a definition they have established.

My mother insisted that liver tasted good; my son insists that squid tastes good. They are both quite right. They both have "bad taste" in this matter. I know, I tasted both liver and squid and found them revolting. It is "bad taste" for me to eat these things. A neighbor of mine has his garage wall papered with pin-up female nudes which his wife will not permit in the house where she has hung seascapes and colored photographic reproductions of trees and flowers. Each, the other insists, has "bad taste." Another neighbor's house, furnished neatly from an expensive department store under the direction of an interior decorator, is accepted as being in "good taste" by all the neighbors but one, who lives in a clutter of books, trunks, magazines, old photographs, mis-matched furniture, and oddments of objects. She has, according to the group standards, no taste. What she has, in my opinion, is everybody's taste, something for anybody. There is an old theatrical photo of a lady in tights, a faint old watercolor of a sailboat, and a papier-mache bird that would thrill the department store decorator of the "good taste" neighbor. And it would thrill her, too, once she was told authoritatively that it was good.

Happily, the graphic designer need waste no time in the attempt to define good or bad taste. He may leave such matters to the critics and interior decorators. Privately, he will have personal preferences, professionally he will have no taste or everybody's taste.

## WORDS AND PICTURES

Words and pictures form the message and, ideally, the graphic designer has a well-developed vocabulary of each.

The graphic designer with a limited picture vocabulary must be content to produce nothing more than typographic arrangements, an artistic orderliness. The designer limited in both picture and word vocabulary is likely to produce communications expressed in weak words and graphic grunts.

Simple comminications, such as "Stop," "Go," or "Danger" can be reduced to graphic terms easily and can be understood as quickly as the words, once the receiver is educated to the meaning of the graphic symbols. The automobile driver has been educated to respond to the universal graphic symbols of red and green. "GM" means General Motors to a great many people educated to its meaning. So does the red cross. But the letter "A" reversed in a black circle, means practically nothing to anybody except the proprietors of the Associated Discount Printing Company of Los Angeles. They are obliged to use words to describe themselves, lacking funds, perhaps, to educate the world to the meaning of their graphic symbol.

And while graphic designers continue their struggle to produce a universally acceptable symbol to designate a "Women's Toilet," the world must accomplish this simple communication with words.

The graphic designer, properly educated, would be equally proficient in both writing and drawing, for his work is to combine the two into an effective communication.

The poster, in its ideal form, represents an impressive accomplishment in efficient communication. The billboard on a busy street or highway is a form of information-transmitter that makes great demands upon the designer. In fractions of seconds, the billboard poster must attract, interest, and inform the passer-by, sometimes almost subliminally. The graphic designer who has gone through the painful process of refining and distilling, reducing information to a transmittable form in this difficult medium, has earned his bread. To have gone farther than mere information-reduction, the graphic designer who has designed a poster that transmits an emotion along with the simple, clear information, deserves cake and a medal.

The simplification of information into a transmittable form, this distillation process, can produce some strange results. Advertisers, those bright ones, who recognize that the world may not be hungrily awaiting their pronouncements, struggle to achieve the efficient ad-communication. Sometimes, it is achieved. Often, however, the information-distillation process malfunctions.

The New York Life Insurance Company, attempting to distill something more efficient out of their lengthy company name, came up with "Nylic" after what I am reasonably certain was a considerable labor. Their advertising, company forms, and their doors bore the new simplified form. Twenty-seven bits of information had been reduced to a mere five, a substantial accomplishment. It may have been a telephone switchboard operator who choked while delivering the greeting, "Good morning, this is Nylic," or the salesman who announced cheerily, "Nylic calling" and was mistaken for a low-voiced Avon Lady, who revealed to the information-distillation department of the New York Life Insurance Company that they had refined a new word-form better suited to a synthetic lollipop. Several years, and many dollars later, the company abandoned "Nylic" in favor of a more comprehensible "New York Life."

The yellow pages of a large city telephone book are rich in examples of attempts to reduce thoughts, ideas, or information to graphic symbols in the form of trademarks; the vast majority of which mean nearly nothing except to their owners and to the graphic designer who produced them. To the twenty-six symbols which comprise the English alphabet have been added thousands of symbols, without consideration of the fact that education is required to make the graphic symbol have meaning. The reduction of information can, too often, result in the destruction of meaning. For, while it is possible to take any coined-word or graphic symbol and make it mean something, the expenditure of time and money for education is immense. And, yet, new ideographs are added daily by graphic designers, arrogantly or ignorantly confident that through graphic symbology they have contributed to clarity, meaning, and understanding.

Conversely, in my view, they have produced a contribution to a complex collection of ideographs already as difficult to comprehend as written Chinese. According to a Newsweek report in 1966, the Chinese have had some thoughts on graphic symbology that may add further confusion. The almost universal color symbology of the traffic light was challenged by the Red Guards as they rampaged through China. *Green*, they proclaimed, should mean "stop," *red*, the color of political revolution, should mean "go."

A picture may or may not be "worth a thousand words." It may be worth a hundred, a few, or none. Or, it may be required that a thousand words be used to explain a picture. My "Art Appreciation" teacher in high school seemed to feel that a thousand words were *deserved* by any picture she displayed and heaped confusion upon redundancy as she gave each picture its due.

The graphic designer, though more likely a picture-oriented rather than a word-oriented person, must design intelligently with both words *and* pictures. It is his responsibility to determine where words communicate best and where pictures do. Ideally, he should be equally proficient in both writing and picture-making.

How many words does it take to describe a rose? Or a baby? How would the difference between a dog and a cat be described in words? Or, how many pictures would be required to translate the Lord's Prayer into graphic terms?

Now, many a person who titles himself a "graphic designer" is merely a mechanic who, given the text of a message, together with available visual matter, assembles them within a given space. He may add a few "artistic embellishments" to ornament the communication which add nothing to the meaning. This "graphic mechanic" has few questions to ask other than, "How big," "What color," and "How soon."

The ability to render information in visual form has its root in drawing, the ability to transform information that

The ability to render information in visual form has its root in drawing, the ability to transform information that is seen, heard or imagined into a graphic form. And, though the camera has increasingly replaced the drawing tool as a data gathering device, it remains only a tool, I believe. The camera can "see" and record only that which its operator directs it toward. It records only that which it can see. It cannot record that which does not exist at the moment of the exposure. It cannot record that which *was* or that which *will be*. The camera does not lie but its operator may cause distortions and deceits to occur through the manner in which he directs his instrument.

Few people are totally aware of the ability of the shrewd operator to stretch, shrink, selectively conceal and artificially enhance the photographic image. Spurious information can be added, truth subtracted. The myth remains, *the camera doesn't lie*. And the makers of advertising, fiercely wishing to be believed, employ it increasingly.

The illustrator can produce a picture indistinguishable from a photograph. The photographer can produce a picture exactly like a painting or drawing in technique. The public couldn't know the difference and, if it knew, would care little. A picture is a picture.

Yet, among professional makers of pictures, an active separation exists. The Society of Illustrators of New York, and similar organizations in other parts of this country, does not permit photographers to become active members. And, though it is unlikely that an illustrator would apply, the Society of Magazine Photographers would not encourage a maker of hand-made pictures to join their group.

The graphic designer cannot afford to

limit his view-point with such narrow distinctions. To him, a picture is a picture regardless of the method of its manufacture. His concern is, quite properly, the content of the picture and what, and how effectively, it communicates.

A graphic designer should, I believe, be knowledgeable of the methods of producing silver-particle pictures or pigment pictures and capable of producing either. I would be careful, however, which method he was taught first. It is far more successful to teach photography to a student who is grounded in drawing. Drawing is direct. There is no machine, no instant image, no complex mechanical techniques to learn or to become distractively involved with.

Drawing from the model, the object, or imagination trains the student to see and to record. The pencil is a simple tool. Information fed to the eye or ear, fed to and through the brain comes out graphic. There is continual input: Information-brain-hand-tool-drawing and continual feedback. Such training as this comes close to duplicating the work-thought processes of the graphic designer, the translation of information into graphic representation.

The photographer can, and frequently does, become far more involved with the techniques and machinery of his craft than he does with the content of the pictures he produces. Rather like the owner of a grand hi-fi reproduction machine who becomes so fascinated with the mechanics and capabilities of his sensitive equipment, that he never gets around to the point of using the instrument properly, he is satisfied instead to hear "Sounds of Sebring," "Locomotive," and any record which demonstrates the machine's audio capabilities. The machine becomes an end in itself, the music which the instrument was designed to deliver is incidental.

I have wondered, listening to the technical talk of a group of photographers, if a layman, ignorant of such terms as "latent image," "exposure index," "reciprocity factor," might believe he had encountered a group of nuclear physicists should he overhear such talk. The layman might look at his Polaroid Swinger with new respect, but he would have learned nothing that would improve the quality or content of his pictures.

I use a camera but I leave the physics and chemistry to the photo-finisher which leaves me free to concentrate upon the content of my pictures. I also use another recording instrument which, though sometimes slower, is less complicated, lighter, cheaper, and more compact, my pencil.

## THE GRAPHIC MACHINES

The graphic machines will bring greatly improved efficiency to the production of exciting new graphics and dull old ones. Many "graphic mechanics" will be obliged to look for some other line of work.

According to Beaumont Newhall in his book, The History of Photography, the first published account of the camera as an aid to the draftsman appeared in Giovanni Battista della Porta's book, Natural Magic of 1558. Newhall quotes from a book by Count Francesco Algarotti, published in 1764, "The best modern painters among the Italians have availed themselves greatly of this contrivance; nor is it possible they should have otherwise represented things so much to life."

Graphic artists, employing the early form of the camera, the camera obscura, worked inside its room-sized enclosure, recording by hand the images formed upon its wall through the pin-hole aperture which admitted the image of the subject outside the dark box. With the application of lenses, the camera became smaller and more portable; the graphic artist was now outside the box, tracing the image projected upon ground or frosted glass.

With the development of photo-sensitive materials, the camera grew smaller, its images recorded physically and chemically, rather than by the artist's hand. By 1900, through the development of George Eastman's Kodak camera, the mechanical and chemical complexities of picture-taking vanished. Anyone could make pictures. "You press the button," stated Kodak advertising, "we do the rest."

The graphic artist used the new tool as a data-gathering device and continued, as he still does, to use variations of the camera obscura.

Graphic purists resented the camera and referred disdainfully to it as "The Art Machine." Illustrators denounced the machine publicly and used it privately, photographing objects and figures, projecting the images upon paper and rendering the information in pigments.

"Painters and illustrators," a writer stated, "ran in confusion from the camera....from the forceful realities that it recorded....and hid among abstract images hoping that the frightening machine might go away." Many still run, the camera clicking fiercely at their heels. The "Pop Art" period may mark the time when the war between the camera and the paint brush came to an end.

The graphic designer, the "new boy" in the field of graphic communication, unfettered by tradition, unhampered by prejudices, is not concerned with the mechanics of picture-making. Quite properly, his picture selection is based upon content, not upon technique. Quite soon the graphic designer may choose a picture made by hand, made by the semi-automated camera or the totally machine-made picture produced by computer. Boeing Aircraft, among others, is well along with the development of the data-fed, computer-controlled drawing machine. The capabilities of their "computer graphics" department have been impressively demonstrated in the making of a number of motion pictures utilizing computer-machine-drawn animation of considerable complexity. In 1966, they produced what is probably the first computer-drawn rendering of the human figure in motion, on film.

During the late 1940's and early 1950's, the illustrator seriously felt the impact of the camera upon his livelihood; magazine editors and advertising agencies used increasing amounts of photography and many an illustrator found himself unemployed, automated out, more properly, semi-automated out. But out he was. The first illustrators to disappear were those whose work had been most influenced by the camera, the so-called "realistic illustrator" who had embraced the camera as a tool and imitated it so skillfully that he was easily replaced. The camera, which had become his data-gathering device had, too frequently, not only replaced his eye, but his mind as well.

Within the last decade, the increased utilization of the "transfer letter" and "photo-lettering," individual letters in varied styles and sizes which can be composed and arranged by anyone with moderate hand-skills, has resulted in the almost complete commercial death of the lettering man, the specialist who painstakingly rendered words to order.

The Polaroid Land Camera, combined with Photostats, has served to replace much of the hand-rendering labor in advertising agencies. Illustrative matter, products and people, formerly hand-drawn or painted for use in layouts to be submitted to advertising clients for approval, are now frequently photographed instead.

Xerography, applied to film animation, has encouraged many designers to eliminate the hand-inking operation. Pencil drawings can be reproduced quickly and accurately on "cells," the transparent material used for each drawing in an animated film sequence. The process retains the freshness and subtlety of the artist's original drawing usually lost in the hand-inking operation.

Chemistry and technology has provided the graphic designer with an increasing number of work-saving materials. Acrylics replace oil pigments as a painting medium, transparent plastic-based materials applied to drawings and designs supply texture or color instantly and "spray-cans" provide a variety of colors and protective coatings for graphic renderings.

It does not take much of an oracle to foretell the effects that technology will have upon the graphic artist, a wee wizard with a clouded crystal ball can do well. In 1959, in the Bulletin of the Society of Illustrators of Los Angeles, I offered an admonition to illustrators which I think applies to any maker of graphic images: "....in our mechanistic culture it seems most illogical that a function that can be reduced to mathematical formulae and mechanical rendition should be produced primitively by hand.... As technology advances, so will the ability to produce by mechanical means a greater amount of the visual material necessary to communications. This most certainly will relieve the illustrator of a lot of chore work, much as the advent of photo-engraving relieved him of the burden of translating his art to wood, steel, or stone. The freedom of the illustrator will be increased as the machine assumes the tedious task of producing the inevitable dull illustration of dull people doing dull things.

"This future appears to offer the illustrator a great opportunity. The illustrator whose interests are more in the area of mechanics and technics will be able, through the employment of new technological developments, to produce illustration even more mechanistic. The illustrator whose approach is more intellectual will find himself freed from the dull and routine pictures which can be less wastefully produced by machine, and he can enjoy an even greater freedom of expression...."

Boeing's wonderful drawing machine has arrived. Given the right information, it can draw a theoretical anything, almost instantly. The "photolettering" machine actuated by any convenient finger will deliver a practically custom-made line of lettering, now. The Polaroid Land Camera produces a photograph in seconds. The VariTyper speeds up the composing of textual matter. Keys punched in New York cause type to be set in San Bernardino. High-speed presses produce images of increasing fine quality and the magnificent, electronic system of television delivers vital information instantly, in motion, color, and with sound. It also delivers garbage with the same speed. The Polaroid camera delivers a dull picture in 10 seconds. The "photo-lettering" machine will produce promptly a practically custom-made line of lettering, ill-chosen and badly spaced. Boeing's wonderful drawing machine, through no electronic fault, will be capable of producing dull drawings in infinite variety and, if desired, in motion.

Pablo Picasso, Jean Dubuffet or Cosmo Campoli at the keyboard of the mighty Boeing might cause some exciting new images to be formed. They will not likely be invited to play. Instead, Dr. Mathman, Ph.D., may favor us with a few mathematical-graphic selections, if computer-time permits. He might render some improvisations upon themes by Moholy-Nagy, composed in the early thirties.

Dr. Mathman may, however, not be so limited as to confine his performance to new renderings of existing compositions. His graphic deficiency, which he described as, "An inability to draw a straight line with a ruler," having been corrected by the machine, may permit him to produce new images with stunning graphic virtuosity.

In the absence of the doctor's ability to perform with graphic brilliance, one might hope for a strange and curious malfunction of the machine's electronics which would produce something of the order of the graphics of Saul Steinberg. I suspect, however, that the engineering talents of Boeing have "designed-out" any such possible aberration.

## CONTROLLED RESPONSE

Controlled response may be accomplished by the scientist who plants electrodes in animal's brains while advertisers watch and dream.

There is a theory, I think it is mine and I doubt that its authorship will be contested, that the daily behavioral pattern of a woman might be predicted by reading her horoscope at the beginning of the day. The theory is based upon the assumption that women tend to read these astrological prognostications and that, having read them, their behavior might then be influenced. Should the horoscope caution that travel by water is ill-advised, then that might be just the day to plan a fishing trip, if you would prefer to go alone.

With equally crude theories, many adverattempt to calculate the responses of women to their suave commercial blandishments, hoping to discover the way to command and control responses at the supermarket, permitting them to slip their fingers profitably into the woman's purse.

Advertisers watch with interest the experiments being made by behavioral scientists who are inserting electrodes into the heads of animals, applying tiny electric currents which can stimulate certain responses in the beast.

When the discovery was made that visual messages might be transmitted and received within time durations as brief as one-tenth of a second, the theory of subliminal advertising was born. The theory was tested briefly, and inconclusively, before it was banned on television. Similarly, hypnotism on TV was limited to controlled demonstrations. The effects upon the viewer, it was reasoned, might not be altogether wholesome. I had been led to believe that it was not possible for a subject to be guided by a hypnotist and directed to behave contrary to the subjects fixed beliefs. I have now been instructed otherwise. Suppose, I was told, that a man was given a gun and hypnotized into believing that a murder was required in order that his children be protected from serious harm. An immoral act, through the hypnotist's influence, would then become justifiably moral. A woman of normal modesty, standing before an audience, might be influenced to remove her clothing when influenced to believe that she was preparing for baptism at the font of a church. This may or may not be true. I do not know, but I suspect that it is possible, having watched the skilled pitch-man peddling potato graters on the TV and imagining, without much difficulty, the effect upon viewers sitting before their tube in a state of semiconsciousness.

The pitch-man, following his television

performance, can total up the telephone response and measure his effectiveness. The sidewalk pitch-man can measure his success quicker by counting his money. The used car TV pitch-man must wait longer than both to determine response, it takes time for the prospective buyer to drive from TV tube to car lot. The advertiser of new cars waits still longer, unless he offers a particular car at a specified price during a designated time period. Most advertisers are obliged to wait the convenience of their customers. And, while they wait, they fret. Was the communication right? Was it properly formed and transmitted? Was it received? Was there a response? Was anybody there to respond?

One advertiser has stated that he *knew* that one-half of every dollar he spent was wasted for lack of knowledge of the proper form of his message, the method of transmission and the nature of the audience, the receivers. He knew one-half was waste, but worse, he did not know *which* half.

Into this murk of uncertainty come psychologists, marketing analysts, public-opinion poll-takers and sundry soothsayers bent upon relieving the advertisers of their communication anxieties and some consulting fees. Magazine and newspaper publishers supply statistical information on the size and economic status of their subscribers. TV attempts to do the same, offering data on the number of people who may be watching during any given time period. Critics of audience measurement techniques have been especially vigorous in attacking TV statistics claiming that figures based upon 0.0003 per cent of the population's behavior are grossly inadequate.

Attempts to "pre-test" responses to advertising designed for newspapers, magazines, billboards, and television are general throughout the field.
Such tests may range from a simple "D

Such tests may range from a simple "Do you like this" inquiry among the advertisers staff, to an elaborate psychological testing before audiences, which attempt to determine audience reaction *before* transmission.

Magazines and newspapers furnish advertisers with data following publication of an ad which rates the comparative response of interviewed readers to advertising within a given issue of the publication.

Such measurements as these are expensive and are generally available only to advertisers who expend large sums. The advertiser in limited-circulation publications is left to be guided by intuition and whatever direct response of the audience he may experience.

The problem, however, that faces the designer of a graphic communication for a school newspaper, an obscure trade journal, or a TV commercial in a small town is identical to that of designing for a large advertiser buying expensive mass media. His responsibility is to design an effective communication which will *attract*, *interest*, and produce *response*. Wisely, the designer will begin with the best knowledge of the receiver of the communication that can be obtained.

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# VISUAL COMMUNICATION TECHNOLOGY

## by DR. DONALD BYERS

Dr. Byers received a B.S. in Chemistry, Iowa State University and Ph.D. in Organic Chemistry, University of Minnesota. After one year post-doctoral fellowship at University of Illinois and four years in Orchem Division of DuPont, joined Graphic Arts Research Division of Battelle Memorial Institute, Columbus, Ohio in 1946. Dr. Byers was a Research Engineer and later an Assistant Supervisor for Battelle. After 1955, he joined Springdale (Conn.) Laboratories of Time Incorporated as a Senior Research Chemist. Currently, Dr. Byers is an Associate Professor of Graphic Arts and Chemistry at Carnegie Institute of Technology.

### ELECTROSTATIC IMAGING PROCESSES

In this first lecture we shall consider graphic reproduction processes that use electrostatic forces in image formation. Two of the processes involve photoconductivity as well as electrostatics, and I shall discuss them first. Materials that exhibit photoconductivity are relatively good conductors of electricity in the light and are relatively poor conductors of electricity in the dark. These processes are examples of electrophotography.

The two processes involving both electrostatics and photoconductivity are Xerography and Electrofax. Xerography has been developed by Xerox Corp. of Rochester, N. Y. Electrofax was invented by RCA. The two processes have some characteristics in common. They also differ in certain respects. Both processes can be completely dry, that is, they do not need to involve any liquids. This is not to say that they can't or don't, but Xerography as originally developed is a completely dry process. Electrofax as it was originally developed was also a dry process, but the introduction of liquids has come about in order to achieve certain improvements, particularly in the resolution or the fineness of detail that can be reproduced. Both processes are physical rather than chemical. Normally when we talk about photography we think of silver halide process, or one might think of some diazo processes. Silver and diazo are chemical in nature in that the materials undergo a chemical change during the reproduction process. Electrophotography is a physical process rather than chemical. Another feature of Xerography and Electrofax is that they are direct positive photography. In other words, if you take a positive you reproduce it to a positive in one step. You don't have to go through any reversal processing such as you would have to do, for example, with certain kinds of silver halide film. Silver halide as you know normally being a positive to negative process. You start with a positive, which is your original subject and you normally get a negative. Electron photography or electrophotography is positive to positive directly. They are very rapid in processing. It is possible to get a permanent print in a matter of seconds. You can prepare a print on almost any material of reasonable smoothness. And what is reasonable smoothness? Well, certainly you don't have to have anything as smooth as normal photographic paper. You can make prints on wood, on metal, and on glass as well as on paper that is rough. You do not need a special paper for reproduction. So that is another feature of interest. Electrophotography processes are also adaptable to the use of color. In other words you can make colored prints from them and I have a colored print here that you are welcome to look at. One of the outstanding features of electrophotography compares with silver halide photography is that the plates are not damaged by gamma radiation or neutron radiation. Electrophotography is capable of producing continuous tone prints as well as line prints. You can make by these processes images that I am positive you couldn't tell from a regular silver halide print. Now the way of doing this is not a commercial process because it takes equipment that is not readily adaptable to use in office copiers. Those are the features that Xerography and Electrofax have in common. I would like now to tell you how they differ.

The word Xerography means dry writing. There are several steps involved in making a print by Xerography. Many of you are familiar with the 914 Copier. Also there is the 813 Copier and Xerox now has the 2400 Printer, which turns out reproductions almost like a printing press. In all of these machines, the cycle through which it goes in order to get the reproduction is basically the same. The first step is to sensitize the plate. The plate consists of a sheet of aluminum on which a layer of photoconductive material has been coated. In order to make the plate sensitive to light, you must put an electrostatic charge on it, and this is what we mean by sensitizing the plate. Then you expose it to whatever image you wish to reproduce. Exposure can be by contact printing. It can be in the camera, or it can be by projection. The exposure forms a latent electrostatic image. If you look at a plate that is exposed and a plate that is unexposed, you would be able to detect no difference in appearance to the eye because the only thing that has happened is that where the plate has been exposed, the electrostatic image has been removed. It has disappeared, and of course one does not see electrostatic images with the naked eye. The latent electrostatic image can be made visible by the step called development, in which a finely-divided powder is put on the plate. Wherever there is a charge on the surface of the plate, the powder will cling to the charge. Where the plate is not charged, the powder will not cling and in this fashion you get the image on the plate. With Xerography, the image on the plate is transferred to another surface. Normally the image is transferred to paper, although as I mentioned, it is possible to transfer it to other smooth surfaces. But after you have transferred the image, it is just a powder laying on a sheet of paper and if you blow on it or rub it, you could destroy the image. So you must then fix the image, as the next step, in order to make it permanent. Fixing is done by either two methods. You can heat the image to make the particles melt together or you can use sölvent vapors that makes them stick together. In either method, you take what was a loose powder image on a sheet of paper and fix it or make it permanent. The final step is to clean the plate. The plate is not used up, so that you can take off the residual image. Not everything transfers in the transfer step. You can take off the residual image and reuse the plate.

In answer to question: There is a slow leakage of the electrostatic charge in the darkness. If you keep a charged plate in total darkness and by this I mean not only darkness in terms of the eye, but also in terms of ultra violet radiation, it will maintain the charge over a period of several days. But this requires an inordinate amount of care, so the normal thing is to charge the plate, expose it, and develop it, and go on through with the process cycle. The plate wears out only in a mechanical sense, but not in an electric sense. All you are really doing is changing the electronic structure of the coating. Most damage to the plate comes in cleaning off the residual image because you wipe it with cotton, or in some of the automatic machines the rabbit's fur brush that cleans it off. The granular material from which the image is formed is sharp enough that you can scratch the surface of the plate if you are not cautious in cleaning it. Mechanical damage and not electrical exhaustion is what limits the life of the plate. In answer to question: Are you talking about the coating on the plate or the image? Then you shine the image on it one way or another, right. The charge leaks off in ratio to the amount of light that strikes the charged plate, so it isn't a go and no go proposition. You can have all gradations of charge, and this is what makes it possible to do continuous tone work with electrophotography. Let's say that on some given area we have 100 electrostatic charges on every square inch. If you shine a great deal of light on the plate, all 100 charges will leak off through the backing. If you shine half that amount of light, there will be 50 charges left. If you shine a fourth, there will be 25 left, and a tenth of it, there will be ten. Then the amount of powder that will stick is in relation to the charge remaining.

In the manufacture of the Xerographic plates, you deposit a smooth layer of a photoconductive material known as selenium on an aluminum plate. Selenium is an element that is somewhat similar to sulphur in its properties. Selenium is not the only photoconductive material, but is far and away the best one for practical purposes. Selenium has a dark resistance that is about 10,000 times as good as its resistance in the light. In other words, you can charge it in the dark and when you expose it to the light, its conductivity goes up by a factor of about 10,000. This is sufficient to make the process work very nicely, whereas the difference between, let's say copper and a good electrical insulator may be 10 to the 15th power. The coating has to be a particular type of selenium. It has to be the red, amorphous form rather than the gray crystalline form. One of the things that happens to the plate during use is that the selenium starts to change from the red to the gray. When it changes from the red to the gray, then the plate is no longer satisfactory. So that you not only need selenium, but you need the particular proper form. The supporting member can be anything practically that has a conductivity greater than the light conductivity of the material. In other words, you have a plate that is made up of a thin layer of selenium on a support. When you put a charge on the plate, and you may put either positive or negative on it, it will work either way, and then when you expose light to it these charges must be able to leak off to a grounded material so that the supporting material must be a reasonably good conductor. It has to be at least as good as the selenium is in the light. Aluminum plates have been found to be very satisfactory, although paper can be made sufficiently conductive to do this. Certain plastics will work.

In sensitizing the plates, if you want to you can do this by something as simple as the well-known physics experiment of rubbing with cat's fur to put a charge on the plate. This is not really very practical for a machine and so the charge is commonly put on by an electrical discharge, either from needles or wires. The plate is passed under wires at a high potential to put the charge on it in commercial machines. The amount of charge that is put on will depend in part, of course, on how high the potential is. Normally, a few thousand volts is used and you will charge over a period of a few seconds. Of course, the changing must be done in the dark. If you try to charge in the light, the charge will be dissipated just as fast as you try to put it on. In answer to question: It is a very thin layer and is normally put on by vacuum deposition. A little pot of selenium with a heater in it is enclosed in a vacuum chamber with the plate suspended above it. The heated selenium vaporizes and travels to the plate. This is far and away the best way. Selenium has never been successfully put on as a varnish or any other manner so far as I know.

After the plate is charged, the next step is exposure, which forms the latent image. We talked about the latent image, so I think we might now draw a curve of what happens to the plate in its various cycles. We put potential on the ordinate and time on the asbscissa, starting at zero time and zero potential. The first step is to charge the plate. During charging, you get considerable potential and then there is a very gradual dark decay. There is a slight loss in charge as the plate stands in the dark. During exposure, there is a very rapid drop in the potential. You don't completely discharge the plate. There is a residual charge left. Over a period of time, and when you are cleaning the plate, the residual charge disappears. So this is the cycle that you put it through. You charge, keep dark decay as low as you can, expose, develop and print and so on.

Once one has the latent image, there are three methods that may be used with xerography in order to put the powder image on the plate, that is, to carry out the development step. The first one that I would like to talk about is called cascade development, and this is the method commonly used in the office copy machine. A cascade developer is a mixture of two materials. One is a relatively large irregular shaped material called the carrier. And then associated with it, are very small particles of material, the toner, that actually make up the image. One of these will bear one charge and one the other. If the carrier is positive, the toner will be negative and visa versa. You may control which charge you want, but the carrier and toner are attracted to each other by charge. If we could have the first slide, I think I could show you what this actually looks like. Cascade development is commonly used for line work. It is possible to use it for halftone work, but it takes a rather specialized setup to use it. The formulation of a proper cascade developer depends on triboelectricity. That means that you must pick the toner and the carrier with the right electrical properties so that one will charge positively and the other negatively. Those of you who studied chemistry have heard of the electromotive force series which is an arrangement of metals with respect to their activity. There is also a triboelectric series. Materials are listed in an order that tells you how they will behave one with respect to the other in contact charging. I might put one series on the board just to show you some of the things that can be used. For example, you could have corn meal at the positive end, and then you could put cork, rosin, sand, and finally tartaric acid at the negative end of the series. If you take any two of these materials in a relatively fine state of division and put them together, each material will acquire a positive charge when it is contacted or rubbed against the material below it in the list. In other words, if you put corn meal in with any of the others and roll them together, the corn meal will take on a positive charge and let's say the rosin will take on a negative charge. The farther apart they are in the series, the greater the difference in potential will be. So that by proper choice of the carrier and the toner, you can determine the size of that charge. I don't know what is used commercially. There are proprietary resinous materials and, of course, much more exotic than these. But this illustrates the manner in which one does cascade development.

There is another method of development called powder cloud. You generate a cloud of powder around the plate and it will cling to the image where it has a charge. In answer to question: You have a tray with the mixed toner and carrier, and you cascade them across the plate. Now over a period of time, of course, you are generating the visible powder image out of a toner so you are continually removing toner from the developer. After some period of time, generally determined by simply observing that your print looks light, you have to retone the developer. Retoning means putting in some more toner and then rocking the tray. Just by the very nature of the materials, one takes on a positive charge and one the negative. Of course, you will want to generate on a charge on the toner that is opposite to the charge on the plate. If we wanted to use that plate, actually we should have a negative toner particle attracted to a positive charge on the plate. You purchase the developer as such and the toner separately. You have to retone from time to time. Returning now to powder cloud development, you put the exposed plate in an enclosure and just generate literally a cloud of fine powder, which has only a one component. This would basically be only the toner and you just generate a cloud that is attracted to the charged area. Powder cloud is capable of much finer resolution than cascade. You can use powder cloud development to do continuous tone work or put it another way, you can do 400 line halftone work with powder cloud. But it is not used commercially.

The other method of developing electrostatic images is called liquid immersion. And that again is quite a descriptive term, because it is a liquid and you immerse the plate to develop it. Liquid immersion uses a two-component developer. You have a liquid that contains charged developer power suspended in it. The liquid may be something such as a petroleum fraction, probably lower boiling than kerosene, but not so volatile as gasoline. You want an insulating medium for the liquid and the powder is dispersed in the liquid to form the developer. You immerse the charged and exposed plate in the developer, the small resin particles cling to the plate, and then is self-fixing when the liquid evaporates. Now this is far more common with the paper support than it is with metal, so in describing methods of development here, I have veered probably a little bit over into what more properly belongs in Electrofax, but it can be used in Xerography. So there are the three methods of development. Cascade is very commonly used in Xerox office copy machines. Powder cloud is not commercial. Liquid immersion forms the basis of many, many of the competitive copy machines that are on the market. In answer to question: Considerably better. Liquid immersion is extremely good on resolution, that is one of its virtues, and it is rapid also. Again, getting perhaps a little ahead of the story, there are copiers where you get the image directly on a sheet of paper, such as Dennison, SCM, Bruning, and others. When I mention names here, I am not recommending machines. I simply want to tell you commercial names which you might recognize and be able to tie in more closely with what we are talking about.

In the transfer of the image, one need only place the paper in contact with the plate and then put a positive charge on the back of the paper. We make this stronger than the positive charge that is on the plate, and then the negatively-charged image particles will go to the paper, so it is simply a matter of manipulating positive and negative electrostatic charges.

Then having transferred the image to the paper, the next step is to fix it or make it permanent, so to speak. If you either heat the paper or put it in an atmosphere of an appropriate solvent, the powder particles will weld in together and weld to the paper. This makes the image firm enough so that when you rub it with your hand, it will no longer smear.

For cleaning the plate in the hand copiers, you just wipe the plate carefully with a wad of cotton. In the automatic copiers, a fur brush rubs against the plate and cleans off the excess powder. Then you are ready to go through the cycle again: Charge, expose, develop, transfer, fix, clean.

Selenium is not equally sensitive to all wave lengths of light, so certain colors copy better than others. Selenium is sensitive to blue and green, but it is not sensitive to the red end of the spectrum. In other words, red light will not make the plate discharge. You can dope selenium with certain materials to make it sensitive to red, but then you decrease some of its other desirable properties. So the normal sensitivity is primarily to blue or green and this does, on occasion, create some problems, particularly if you have an original image which is light blue. If you take a white piece of paper and write on it with a light blue ink, it doesn't copy very well. If you use either black or red ink or pencil, you will get a far better reproduction. The reason for this is that white light consists of red, green, and blue light. The white sheet of paper reflects all the visible wave lengths rather equally, that is why it looks white. Now, if you put a blue image on a white background, the plate can't distinguish blue light of the image from the blue light that is in the white light. So image area and non-image area affect the plate nearly the same and a poor reproduction results. This is the same thing, of course, that you run into if you use a blue sensitive film in silver halide photography. It isn't anything peculiar to Xerography, it is simply that if the film or plate is going to show you a difference in image, it must "see" something different. I wouldn't want you to think that you get absolutely nothing, but I would like to have you understand why you get a poor image of blue on white and why one should avoid this type of copy.

The speed of selenium plates is about 2.0 ASA rating. If you are familiar with silver photography, you know that fast black and white film might be in the order of 400. Some of the color films will run around 10, 25, or 40 or so. So that selenium is a relatively slow material, compared to silver. One simply comes out with a situation that is normal. Here is a process that will do some things that other processes won't. It will do somethings that other processes will and vise-versa. What you do is set up your machines and your type of work that you want to do to take advantage of its strength and by-pass its weakness.

I would like now to spend a little time on the second process for electrophotography and then get on to some of the electrostatic printing methods that do not involve photoconductivity. The Electrofax process is a development of RCA and as I mentioned, has a number of features that are similar to Xerography and some that differ in rather important respects, too. The plate material is paper coated with zinc oxide in a resin binder. Xerography has selenium on a metal plate; Electrofax has zinc oxide and a resin binder coated on paper. That is one important difference. Electrofax works satisfactorily with a negative charge only. In other words, you can only put a negative potential on the plate. This is not serious and is no real limitation on it because many times it doesn't make any practical difference which charge you put where as long as you can get powder of the opposite charge to cling to it. The exposure is the same as with Xerography. You can do it by projection, by contact printing or in the camera. The method of development that was originally worked out, though, is a rather interesting one and I would like to show it to you, again, more from historical interest than practical application. (SLIDE) Magnetic brush development was used originally on Electrofax. This is a paper that has been coated with zinc oxide in a resin binder, charged and exposed. The developer is a mixture of iron filings in the resin powder. You simply take a magnet, make a brush out of the iron filings. The magnet with the resin powder clinging to the iron filings is used as a brush on the latent image to make the image appear. This is changing the electrostatic image into a visible image. Again, the iron and the resin must obey the triboelectric series. This isn't a matter of just using anything you want to. But it is a somewhat novel way of development. I would say more a laboratory method than a commercial method. Normally in Electrofax there is no transfer step. The plate, as it were, is simply used as the image bearing support. The zinc oxide coated paper you purchase is the plate and then the image is left on with no transfer step. The fixing can be done either by heat or solvent. Many office copy machines use zinc oxide coated paper and liquid immersion development.

The zinc oxide photoconductor system can be dye sensitized to make it panchromatic. Zinc oxide itself is sensitive only in the ultraviolet and into the visible violet. This would not be particularly useful. By putting in the proper dyes, zinc oxide can be made sensitive to the blue, the green, the yellow, the orange, and the red. That is rather a brief treatment of Electrofax. Probably it deserves more, but in principle it is similar in many ways to Xerography so that I avoided that duplication.

Now as to some of the applications. Certainly office copying has been one of the big fields for both methods, and I think we have talked enough about that. You can prepare offset duplicator plates as we mentioned and this is done by both methods, that is by Xerography and Electrofax. One thing being tried with Electrofax has a tremendous interest in magnesium for photoengraving. The idea is to take a magnesium plate, coat it with a zinc oxide composition to make a plate that you can sensitize, put directly into the camera, expose it to your image through a halftone screen if you like and then develop it. When you burn it in, you have your photoresist right on the plate and all you have to do is get rid of the zinc oxide and you can etch the plate. This gives you basically a pre-sensitized plate for photoengraving. Really it isn't a pre-sensitized plate because it isn't sensitive until you charge it, but the plate would come to you coated with a material that you could use directly in the camera and by-pass film and photo printing in order to make a photoengraving. Just what the stage of success is in this, I don't know.

Technically, it can be done. Whether it is something that will be economically sound is still a question.

I think that is sufficient about methods that involve photoconductivity and electrostatics. I would like to go now to a few examples of what electrostatic printing is. The first example is the Videograph, developed by A. B. Dick Company. The Videograph is a label printer for magazine address labels. It runs at a fantastic speed. The Videograph uses a special cathode ray tube, which is in some respects like a TV picture tube in the sense that there are electrons involved and that you have to control an electron beam. But instead of having a phosphor on the front of the tube, it is perforated by a myriad of fine wires that go through the glass envelope of the tube. These wires are about a thousandth of an inch in diameter. The wires are charged by the electron beam in an appropriate pattern to form a letter. The charge is sprayed onto a strip of paper, and the image on the paper developed to get the printed characters. The printed powder characters are fixed by an infrared image fuser. Labels come from the machine at the rate of 37 per second ready for application to magazines with standard labelling equipment.

Another method of interest is called electrostatic screen stencil printing, commonly called ESSP. As you see, it is abbreviated in the popular way of naming processes. This method is also one in which the image is transferred without contact between the plate and the paper. I think one would have to consider as being one advantage of these electrostatic methods of printing, the fact that the plate does not contact the paper. Lack of contact permits you to do some things that you cannot do if you have to have direct contact and the pressure that is normally associated with a more conventional method of printing, with which we are all familiar. Those of you that are acquainted with what is called either silk screen printing or screen process printing, depending on the individuals to whom you talk, will see that this is an adaptation of silk screen printing or screen process printing. The key words here are screen stencil because what you actually use in screen process printing is a screen stencil. Only here we are going to control the ink or the pigmented material by electrostatic forces rather than mechanical means, where you squeeze them through the screen as is commonly done with screen process printing. Although the stencil screen is prepared by silk screen methods, it is composed of a metal or conductive fiber. The open area of the screen is the image area. This stencil electrode is arranged in a two-electrode system in which a parallel conducting plate acts as an oppositely charged electrode. The screen and plate are separated by an air gap, which should be narrow. A dry powder material is put on the screen stencil where the particles become charged and jump across the air gap toward the oppositely charged back plate. A sheet of paper placed between the electrodes intercepts the particles and becomes printed.

Because there is no contact between the printing plate (stencil) and the material being printed, it is possible to print on unusual surfaces such as cotton corduroy, sponges, foam, even a raw egg yolk. In the normal case, the powder image is fixed either by heat or solvent.

The latest printing method to employ electrostatic forces for transfer of "ink" from plate to paper is electrostatic gravure. The method is still in early stages of development and is confined to line subjects. But a powder ink is put on the cylinder, the excess removed by a doctor blade and the powder in the image areas caused to transfer to paper by electrostatic forces.

## ELECTRONICS

Today and probably tomorrow I would like to talk about three and four color reproduction. Although the lectures will be primarily related to printing processes, the principles of color reproduction by printing or by television or by some other processes are basically the same. We shall start out with a discussion of some of the principles of color reproduction no matter what the process, and then turn to three and four color reproduction by printing.

This color print may not show up too well. It is a three color print, perhaps four color--I don't know--called an Electrocolor print. It was given to me by Mr. Marsh and it is a recent development of 3M Co. I show it to you not because we are going to talk about it, I don't know that much about it. I don't know whether details have been released. But the principle on which it operates, that is the colored materials that are put down, have to obey the same rules for color reproduction as you do in process color printing. So it is of interest. The print illustrates another method of color reproduction that does not involve printing in the same sense that we speak of it of putting fluid inks on a paper by some kind of press, but the principles are the same.

To talk about color one must first consider light, because without light there can be no color. The question is asked and has been asked and it will be asked in the future..what is light? There have been many theories about what light is, down through the years, starting from perhaps more than 300 years ago. I don't think anybody is certain yet that we know all there is to be known about light. But one of the early theories was a tactile theory. This theory proposed that the eye sent out some kind of invisible antenna that felt an object and brought back a sensation. I suppose this theory arose because at that period in history, people knew that you can feel something with your fingers and if you see it with your eyes, maybe there is something that goes out from the eye and touches the object. This we now know not to be true. Next came the emission theory. Proponents of the emission theory said that objects emit something. They didn't say what was emitted, but something entered the eye and produced the sensation of vision. This theory was rather nebulous, but really not entirely incorrect in view of what we now believe light to be. There is something that comes into the eye. We call them light waves usually, although the something is also called particles. We shall get into the argument about particles and waves a little later. Next came the corpuscular theory which postulated the interaction of material particles with the retina of the eye. This theory can explain shadows. If there are little particles or corpuscles, we may think of them as bullets, then we wouldn't expect them to go around a corner. We would expect light to cast a shadow. It is difficult to explain the lack of pressure, though. Supposing there are particles that hit the eye---one might think we should feel something, but we don't. Although it is known that light does have a pressure, a very, very delicate instrument is needed to measure the pressure. It is not at all surprising that we do not feel pressure on the eye. The corpuscler theory would not explain interference colors. Interference colors form when you put a drop of oil on water. The pretty colored bands are interference colors, which can't be explained satisfactorily by the corpuscler theory. Later on, a Dutch scientist named Huygens proposed a Scalar wave theory. Scalar means representation by a number, but no direction. It would simply be a quantity, let's say from 1 to 100. By this theory, you can explain reflection and refraction and interference. Thus, there are a few more properties of light that can be explained. But the scalar wave theory does not explain polarization or the fact that light travels in a straight line. This theory was inadequate and was succeeded by a vector wave theory. A vector has not only magnitude as does a number, but also has direction, such as an arrow that points in one direction and has a certain length. The vector theory can explain polarization of light and also straight-line propagation. The vector wave theory at the time it was proposed in 1814, was about as close as anybody had been to accounting for all of the phenomena that one sees as light. A few years later, a very capable scientist by the name of Maxwell promulgated the electromagnetic wave theory, which takes account not only of what we call light, because we can see the electromagnetic waves, but it accounts for a whole range of wave lengths of radiation that are produced by the oscillation of an electric charge. The movement of the electric charge may be at the atomic level, or at a molecular level. The electromagnetic wave theory of light is the most satisfactory. It is a vector theory in that there are both direction and magnitude for the electric portion of the wave and for the magnetic part of the electromagnetic wave. Whether this is the final word is doubtful, but this theory is the one that is generally accepted. But I don't think that we should feel that simply because we have a theory that explains most everything that it is necessarily the final word and certainly we know that it isn't. In the photoelectric effect, light and other radiation cause electrons to be ejected from the surface of certain metals. In other words, photo cells are also a phenomenon that must be accounted for and this can be explained most readily not by a wave theory, but by a particle theory. There is work of other scientists that supports the fact that light exhibits a particle behavior also. So one comes to the point where there are arguments in favor of a wave theory and arguments in favor of a particle theory and the easiest way to reconcile these is to say that both of these models are correct. Light under some circumstances behaves as a wave. In other respects, and at other times, light behaves as though it were a particle. Generally, we are thinking of involvement of a large number of events so the wave theory is best because it is a probability theory. In terms of small numbers of events like the operation of a photo cell, or in the operation of a light integrating meter, you can account for the performance of the light integrating meter much more readily on a particle theory than you can on the basis of a wave theory. But I don't think it is necessary to labor this point. We will use the theory that suits our needs at the moment. Some things that we will talk about are best explained by wave theory and some by particle. As people with a more practical approach, we are at liberty to be concerned more with the way light influences reproduction processes by printing than its exact nature.

It is necessary in talking about colors to have some method of describing them other than saying red, yellow, blue, and so on, because if I hand you a lemon and ask what color it is, you will reply that it is yellow. I will hand you a banana and you will tell me that is yellow. If I give you a sunflower, you may tell me that is also yellow. If I show you a jar of mustard, you will say that is yellow, but they don't look alike. We must have something, therefore, other than saying simply that something is yellow. So, to describe color, it is common to use three attributes. The hue which describes where it belongs in the spectrum, whether it is basically a red or an orange, as distinguished from green or blue. Another attribute is saturation, which is the departure from a neutral gray of the same brightness. There is also brightness. We may say something is a dull red or a bright red. We should think in terms of hue, saturation, and brightness. If you take a red of a given brightness, for example, something like crimson and you begin to add white to it, you will desaturate it so that when you begin to contaminate the color with white light, you begin to decrease the saturation. These are three terms that are in rather general use. Hue, saturation, and brightness although they go under different names depending upon what system you are using to describe colors. Now there are other methods of specifying color. One is known as color temperature, which you run across rather frequently in the graphic arts. You may note that film is for use at 3800°, for example. Or somebody will say the illumination on my table for matching proofs is 7400°. Or there may be some other use of these numbers that run all the way from around 3000 up to about 7000. These figures arise from the system of color specification called color temperature. The numbers mean that the appearance to the eye is the same as though you had a perfect black body radiator heated to a particular temperature. (SLIDES)

We want to talk tomorrow largely about what we call process printing. It is important to distinguish between non-process and process color printing because they are based on different principles. In non-process printing you print the color of ink that is to be the final color of the object. In other words, if you want to print a green color you will print it with a green ink. If you wanted to print an orange color, you print it with an orange ink. This is a relatively simple type of color work and it is used very extensively in greeting cards and displays and some packaging materials. For example, if you were going to print Hershey Bar wrappers, which is a particular brown, you could print the wrappers by using process inks. But it would be not a very sensible thing to do. It would be far better to print the wrappers in one pass through the press with a brown ink that looked exactly like you wanted it to, than to run it through three or four printing units in order to get that particular brown. Or if you were going to print the orange disk for Gulf Oil products, it would make more sense to print it with an orange ink than it would to go through the use of a magenta and a yellow ink and two passes through printing units. So that in non-process printing you print the color that is to be the final one that you want. Process printing, which is required to reproduce a multi-colored drawing or a painting or a color photograph or a color transparency, differs from non-process in that the ink colors are not the final desired colors. You usually use three colors plus black, and with these three colors plus black you can reproduce nearly all of the colors that occur in the visible spectrum.

# CHEMISTRY OF LIGHT-SENSITIVE SYSTEMS

At the end of the period yesterday, we had distinguished process color printing from non-process by virtue of the fact that in non-process printing it is a relatively simple type of printing. You lay down the color of ink that you want to be the final color. If you want green, you print green. If you want orange, you print orange and if you want brown, you print brown. This will take care of the needs of certain types of printing. However, if we wish to reproduce with one set of inks the normal type of copy that is generally submitted to a printer for reproduction, such as original paintings, oils, or water colors, color transparencies, or color photographs, we use inks that can be printed one on the other to form new colors. Overprinting to form new colors is the basis of process color printing. Most commonly, one uses three colored inks, known as magenta, cyan, and yellow, plus a black. Theoretically you can use only the three...the magenta, yellow, and cyan and reproduce practically all the colors of the visible spectrum as well as black. However, it is common practice in printing to use those three colors plus a black printer for reasons that will become evident later on this morning. There are certain processes of four and five color printing where you use four and five colored inks not including a black. Use of four and five colored inks has not found any particular use in the graphic arts because the problems associated with color correction for four and five color printing are usually not worth the improvement that you get. You do get some improvements, but you pay too much of a price for it. For certain uses people will buy a five color press. For example, in magazine printing there will be a great deal of advertising printed in color. Four of the units would be used for the regular process printing and the fifth unit for some specific color that would be non-process. One common example of this is the cover on TIME magazine. The red border is not process color. Rather it is a fifth color and simply a TIME magazine cover red, whereas the illustration on the cover is printed with process colors, cyan, magenta, yellow and black. But before getting further into this, I would like to take up the question of primary colors. There is a difference of opinion between artists and printers about what constitutes a set of primary colors. I don't expect to settle anything here today, but I would like to explain the difference between them and why, for printing, the artist's primaries would not be acceptable. The artist has every right and, indeed, should use whatever colors he needs to express whatever he is trying to express. If the printer has to reproduce a variety of paintings, he cannot hope to use as many different inks as the variety of paints the artist might use in painting all of the pictures that might appear, for example, in one issue of a magazine. We turn briefly again to the tri-stimulus response of the eye. We have red, green, and blue receptors. This is the basis on which process color printing rests. We print on white paper with transparent inks that absorb certain colors. That is, we do process color printing by subtractive color principle. And I would point out to you that in process color printing on white paper, that all of the color that you can ever hope to get from a sheet of printed paper is already there when you buy it. In other words, all the color is in the paper. The only thing that you can do in printing it is to subtract color that is reflected from the unprinted paper. So if your paper is low in blue reflections, in other words, tends to have a yellow cast to it, there is absolutely no way that you can get a good blue out of it because the only blue that can come out is what is in the paper to begin with. We control the amounts of the three light primaries ---red, green, and blue---by using three inks each of which absorbs 1/3 of the spectrum and transmits 2/3. (SLIDES)

Magenta ink absorbs green, but transmits red and blue. Cyan ink absorbs red, but transmits blue and green. Yellow ink absorbs blue, but transmits red and green.

The primary reason for color corrections as far as technical reasons are concerned is the fact that the magenta and the cyan inks are imperfect. The cyan ink absorbs too much green. In other words, it is low in green transmission and the magenta absorbs too much blue or it is low in blue transmission. You can correct for this in a variety of ways, but I think there is only time to take up one example of one kind a correction technique and that is by masking. (SLIDES) This slide contains the essence of three color reproduction using positive masking. It is only one of a number of masking methods.

Even with all of the tools and techniques that are available, there are still limitations to color reproduction by printing. It has progressed tremendously and there is a great deal of very fine work done, but still nobody maintains that the printed page is a real good reproduction of a high quality color transparency. For one thing, the range of colors is usually less than the original. The ink pigments are not comparable to the dyes that are in the color transparencies. The brightness range has to be reduced. A color transparency may have a brightness range of 1 to a 1000. That is, the lightest part may be a 1000 times as bright as the darkest part. On the printed sheet, you are necessarily limited to a brightness range of about twenty-five to one. That is, the best of paper will not reflect 100% of the light that hits it. The best of inks will reflect about 4% of the light that strikes. So that the brightness range--the best that you can hope for --to get in the printed sheet will be in the range of 25 to 1. When you compress this brightness range from 1000 to 1 to 25 to 1, the picture suffers. Sometimes there are problems in reproducing good grays, particularly with three color work. The problem is not so serious with four. So there is still room for improvement in color printing. I suppose the main things that the color printer would like to get is paper that has a truer white reflection. Perhaps a little brighter, but certainly no increase in cost, preferably lower cost. And then he needs inks that have better characteristics as far as transmitting the color they should and absorbing the colors they should. These are the two places that probably the improvements in color reproductions will come. Along with the doing color separation by electronic scanners, which give a more consistent product than is possible through the ordinary photographic methods.

## MATERIALS SCIENCE

Today we shall talk about metals used in graphic arts. We shall discuss three classes of metals. One class is the rolled metal printing plates used in photoengraving. Another type of metal is the electrodeposited metal which is illustrated by gravure cylinders, by electrotypes and by bimetal lithographic plates. The third class includes the case metals, which are those we commonly call type metals.

In the rolled metal printing plate area, there are three metals commonly used for photoengraving; copper, zinc, and magnesium. Copper has been used in this country for fine engraving longer than any other. Zinc has been used for engravings for a long, long time. Magnesium is a relatively recent addition, although I guess, it has been available about 20 years to a greater or lesser degree. These three metals all have some characteristic properties that make them of value for certain processes and not so valuable for others. The properties impose some limitations on the type of work you can do with them and some limitations on the photoresist that are useful with the various metals. (SLIDES)

Hardness, grain size, dimensional stability, and corrosion resistance are some of the properties that are of interest in rolled metals for photoengraving. Rolled metals are also used in offset lithography, primarily zinc and aluminum. Zinc is the old standby, the grained zinc plate having been used very successfully for a number of years and is still used successfully, both as a surface plate and a deep etch plate. Aluminum has been finding more and more favor particularly for the pre-sensitized plate. I think that almost without exception, the presensitized plates are based on aluminum. Aluminum is a brighter metal which may in some instances make it easier to see the image after photo printing or in other stages in the operation of making the plate. It is certainly lighter in weight, a little more convenient to handle. Aluminum is more stretch-resistant and is more easily desensitized because it tends to have an adherent oxide layer on the surface. The permanent oxide layer is water receptive.

A second class of metals used in platemaking are the electrodeposited metals, particularly for gravure cylinders and electrotypes. The standard electroplating system includes a liquid bath in which you can put an anode (the metal that you want to plate) and the cathode, which is the object to be plated. The anode and cathode are connected to a source of electricity, and a current is passed between the two. The metal that is the anode or the positive electrode goes in the solution in the liquid electrolyte and is plated out on the cathode, which is the work, for example, the gravure cylinder or the electrotype. A great number of variables are involved in electrodeposition. There is neither time nor is it necessary to discuss the variables in any depth. But I would simply point out that the strength of the current, the amount of voltage, temperature, agitation and the nature of the salt that is present as an electrolyte all influence the properties of the plated metal. Copper sulphate is very commonly used in making electroplating baths in the electrotyping industry for the primary reason that copper sulphate is preferred is that it is so very easy to maintain in operating condition. A copper sulphate bath is not at all touchy. The bath can be abused and still perform in a manner that is satisfactory. There are other plating baths that will plate faster, give a finer grain deposit, have certain other advantages, but are not as easy to handle. Each has its advantages and each has limitations. The process that you use depends on exactly what you are trying to accomplish. Temperature is another variable. You can also vary the amount of agitation or the stirring. The metal on which you plate will affect the nature of the deposit so that in the electrodeposited metals you have a whole variety of conditions which you must control in order to get the properties that you want in the electroplated metal, such as the hardness, the wear-resistance, the brightness, particularly if you are using it for decorative work. The ductility of the metal and the smoothness are also important. The electroplater has at his disposal a variety of process variables that he can work with in order to produce the type of deposits he wants. In addition to using electroplating for electrotyping, in which you know there is a copper shell deposited on the mold, you can also nickel plate the electrotype to make it last longer, ie. have better wear-resistance. You can, if you wish, put chromium on the surface which makes the wear-resistance considerably better. Most electrotypes that are going to run for more than a few hundred thousand will be chromium plated. From a chromium-plated electrotype you can run a million without much trouble and sometimes more than that. The plating of the metals is used to enhance the performance of the electrotype in its use in the actual printing operation. Gravure commonly uses an electroplated shell. The steel cylinder is electroplated with a thin layer of copper. The etching is done in this thin layer of copper. It may be then chromium plated and run on the press and then the thin shell of copper stripped off and replated. In this manner you can reuse the cylinder many, many times with only a relatively simple and not very time-consuming plating of a new surface on the shell each time. Again, chromium plating is used for wear resistance.

In the field of offset lithography, electroplated metals are used in what are commonly called the polymetal plates or bimetal plates. There are two general classes of bimetal offset plates. The class most commonly used has a copper printing surface plated on either aluminum or stainless steel. In preparation of the plate, one photoprints an image from a film negative very similar to what you do in making a photoengraving. Then you etch through the top metal to the bottom metal. You have two different metals, one of which forms the printing surface and one which forms the non-printing surface. Another common type of the bimetal plate is chromium plated on copper. This plate is comparable in preparation to a deep etch plate in that it requires a positive rather than a negative. The plated chromium is porous in nature. It is not like the chromium on your automobile hardware. If you want protection against corrosion such as you do on an automobile bumper, then you plate a very hard and solid chromium. It is a bright, hard finish. Such a surface would not be satisfactory as the non-image area in a bimetal plate because it wouldn't carry enough water. The electroplater uses the process controls that I mentioned earlier to plate what is called a porous chromium. This is rough chromium, and it has a high surface area with pores needed to carry enough water on the non-image areas to make them ink-repellent. (SLIDE)

We will now go on to type metals, which represent another large class of materials that are commonly used in the printing process. Before we look at why they are constituted the way they are, we should give some consideration to the requirements of type metal alloys. Certainly they should melt cleanly. You don't want a lot of dross on the metal pot because what changes to dross is lost as far as the user is concerned. Dross can be skimmed off and returned to the manufacturer for recovery. You would like a metal that melts at a reasonably low temperature because the metal is cast in the molten condition. Then it must cool to a solid condition in order to be useful. If you can cast at a relatively low temperature, the solidifying process can take place quite readily, and you can get a high rate of production. The benefit of quick cooling would be very evident in the operation of a slug-casting machine, because you can't have liquid metal coming out as part of the product, or you are in all kinds of trouble. So you want it to solidify rapidly. A lower casting temperature also causes reduced wear on the matrices. The matrices will wear somewhat faster if the metal is hotter and, of course, the type metal should cast easily with no tendency to clog any mouthpieces, apertures or other small openings because this means loss of production while you clean it up. Certainly we want something that will give a sharp casting. Otherwise, you get a faulty reproduction of the type such as poor fill-out of the letters and loss of fine detail. In order to get a sharp casting, minimum shrinkage must occur when the metal solidifies. In other words, when you fill the mold, you don't want a great amount of shrinkage or the character as finally comes out in the slugs would not have the same size as you thought you were going to get. Fortunately, the type alloys shrink very little. One also needs a material that will produce type hard enough and strong enough to withstand the intended use, which may be either directly as printing or it may be used to mold a stereotype or an electrotype. The type metal must have, of course, the physical properties that permit going through these other operations. When one looks at this list of requirements, it turns up that about the only materials that stand a good chance of use are the alloys which are based primarily on lead and have a small amount of antimony and tin in them. These are the three metals that are commonly present in the type metal alloys used for linotype, intertype, monotype, stereotypes, electrotypes, foundry type and any other use of type metals. All other metals are subject to limitations that have prevented their finding very wide use. I think there has been some efforts to make cast type out of zinc and perhaps it has been partially successful. Zinc takes a rather high temperature for casting and it has never caught on to the extent that the lead based alloys have. One might think of type materials in the field of plastics. There has been some activity in the use of plastics for casting type of certain kinds, and probably there will be some partial success in those areas. But normally when we think of cast type, we think of type metals. So let's look at the properties of lead, antimony and tin to see what each contributes in the way of something beneficial and what the limitations are imposed on type metals by the properties of the individual metals. The lead is a relatively low melter, 621°F. It is very heavy, as you know, a specific gravity of around eleven and this makes typemetals, in general, heavy. I think this is one of the things that people would like to get away from if they could, but so far nobody has found a method of casting type from, let's say, magnesium which would be just fine from the weight standpoint, but high casting temperature and very definite tendency to corrode on the surface make it completely unsuitable for type metal. So, for the forseeable future, I guess, one will simply have to put up with the weight that is inherent in lead. Lead provides cheap bulk, constituting usually from around 60 percent to about 94 percent of the type metal, depending on the particular process in which it is going to be used. It is a very malleable and ductile metal. You know that lead is quite soft. As a matter of fact, pure lead can be scratched very readily with the fingernail. There are some weaknesses that go also with this softness, so lead in itself would not be suitable. It does not give sharp definition. If you were to cast lead into a matrix, you would not get a well-defined reproduction.

Antimony is a rather high melter, being above 1100° F. Specific gravity is a little bit less than 7, 6.7 to be exact. Thus, antimony has a higher melting point and lower specific gravity than lead. It is intermediate in cost, lead being the cheapest and tin the most expensive. Antimony is normally used in a range from about 3 1/2 to about 25 per cent, again depending on whether you are making an electrotype backing metal or whether you are making foundry type. Antimony by itself is a very brittle and hard metal, but when alloyed with lead, it does two things of advantage. It improves the quality of reproduction by reducing shrinkage. Antimony alone will expand when it is solidified. It is one of the few metals that behaves like water in this respect. Water expands when it solidifies. This slight expansion of antimony when it solidifies, is one of its valuable properties in a type metal. It prevents the shrinkage of lead and tin from becoming too pronounced. Antimony also hardens the lead.

The third normal component is tin. Tin melts the lowest of the three metals. It has a melting point of 449° F., and a specific gravity of 7.3. Tin is the most expensive of the type metals and the hardest one to get. Tin is available in any quantity only in limited areas of the earth, South East Asia being one of those that has the best tin deposits and there is a continual problem of trying to get enough tin to supply the type metal demands. It constitutes usually three percent to fifteen percent. Tin is a soft and ductile metal, but harder than lead. If you mix tin with lead, it will harden the lead, but it doesn't cause the brittleness that antimony does so that it is the combination of the three in the various amounts that make it possible to produce all the desirable characteristics that one does find in type metal. Tin helps in the wear resistance and it does make the alloy more fluid when it is molten so that it will cast somewhat better. Those are the three metals that are commonly used. There are others that may be present either as impurities or may be put in, and I will touch on those as we go through the various uses. But first we must talk about the melting and freezing of type metals because this is the cycle used in casting. You buy the metals in the frozen state or the solid state, melt them in a heated pot, use them in the molten condition, and then solidify them to go ahead with the printing operation or whatever other use you are going to make of the cast metal. A pure metal will melt at a fixed temperature like many pure compounds. You notice that when I quoted a melting point, I gave one temperature. I said, tin melts at 449°. This means that you can take a cup of tin that is solid and you can heat it up to 448° and it is still solid. When you heat it to 449° it will melt and it will all melt over the range of about 1° and become completely molten. This is characteristic of a pure metal. If you take it in the molten state and cool it, it would be completely liquid at 450° but it would solidify at 449°. Pure metals have a fixed melting or freezing point. We speak of melting or freezing depending upon whether you are heating or cooling. This behavior is not usually true of alloys. When you mix metals together, they may or may not melt at a particular temperature. They may melt at one temperature or they may melt over a temperature range depending on the ratio in which you mix them. But the common performance of an alloy is that it melts over a range. There is only one composition, called the eutectic, that melts and solidifies at one temperature. When we speak of having a eutectic composition, we are talking about that mixture of metals in an alloy that behaves, so far as its melting and freezing temperature, just like a pure metal. The transition from solid to liquid to solid will take place at one temperature, just as though it were a pure metal. The eutectic of tin, antimony, and lead has a composition of 4 percent tin, 12 percent antimony, and 84 percent lead. It is a comparatively soft alloy, having a melting point of 463° F.

If a type alloy has more than 12 percent antimony and 4 percent tin, the molten metal will start to freeze at a temperature above 463° F. Crystals of a tin-antimony compound separate out as the alloy cools and continues to solidify, until the eutectic composition is reached. At that point, complete solidification takes place without a further drop in temperature. The tin-antimony crystals are harder than the eutectic and give strength and hardness to the solid alloy. The eutectic composition provides a tough but relatively soft matrix in which the tin-antimony crystals are embedded. The solid alloy is similar to a composition of stone chips (tin-antimony crystals) in tar (eutectic).

The hardness and wear resistance of type metal alloys depend on (a) hardness of the alloy, which is maximum with a balanced ratio of tin-antimony (above eutectic composition) and (b) the proportion of tin-antimony crystals present, which is increased by raising tin and antimony contents together.

For example, suppose a type alloy containing 7 percent tin and 15 percent antimony (balance lead) is heated until completely molten, say 525°F. as the liquid cools, no solid phase separates until a temperature of 503°F is reached. At 503°F., the tin-antimony compound starts to separate. The temperature gradually falls and the metal becomes pasty as more tin-antimony crystals form. At 463°F, the 3 percent excess of tin and 3 percent excess of antimony (above eutectic composition) have separated so the temperature remains constant as the eutectic solidifies. This type alloy has a melting range of 40 degrees (503°F., minimum 463°F.).

Metals for slug casting, such as Linotype and Intertype, need a fluid mobile metal with rapid solidification. These requirements are met best by alloys close to the eutectic. Line casting machines use an alloy of 4-6 percent tin, 11-12 percent antimony, balance lead.

Monotype alloys are harder to provide superior wear in printing. Compositions in the range of 7-13 percent tin and sixteen to 23 percent antimony, balance lead, provide a suitable range.

Stereotyping involves a large casting in a paper mold and rapid solidifying at the face is required. Stereotype alloys are slightly above the eutectic, having a range of 6-12 percent tin and twelve to 14 percent antimony.

For electrotype backing, wear resistance is not needed, but the alloy must be soft to permit pounding up low spots during finishing. These requirements are met by a composition substantially below the eutectic, for example, 3 percent tin, 3 percent antimony, and 94 percent lead.

Foundry type is the hardest of all type alloys. Compositions in the range of ten to 18 percent tin and 20-28 percent antimony (balance lead) to which a small amount of copper is added exemplify foundry type.

In summary, type alloys must meet varying hardness and strength requirements, depending on the end use. Hardness and strength are achieved by adding increasing amounts of tin and antimony.

We will go on with some aspects of photochemistry. Of course, the word photo itself tells us that there is going to be light involved or let's say electromagnetic radiation. When somebody says light, I think only of what is visible. If one speaks about infrared, we think of infrared radiations. If one speaks of ultraviolet, we think of ultraviolet radiations. To say ultraviolet light is incorrect because we cannot see ultraviolet radiations, but I won't fight a war over this terminology. Remember that light has a rather peculiar nature. We use the wave theory when desirable and we use the particle theory when appropriate. There are certain aspects of photochemistry that are best thought of in terms of the particle theory, that is, radiant energy is absorbed and emitted in definite units. Light comes in packages and you either absorb or emit a package or a quantum. The energy associated with one quantum is given the name photon. The amount of energy that is in the photon is related to the wave length. Not all radiation has equal energy associated with it. The shorter the wave length, the more powerful the radiation. In other words, visible radiation or light has more energy to it than infrared and ultraviolet has more energy associated with it than the visible spectrum. Blue light has more energy associated with it than yellow light. This is why certain photographic materials can be handled in subdued yellow light but react when exposed to blue light. Orthochromatic film, which is kicked off by blue or green light, can be handled with a red filter in the safelight because there isn't enough energy gets through a red filter to affect blue-green film in a short period of time. However, this term safelight is a relative term. I think you are aware of the fact that you can't leave orthochromatic film lay under a red safelight for 15 minutes and then expect to use it. While it is basically a red light, some of its shorter wave lengths sneak through and there is enough to be troublesome. So we associate the energy of light with the wave length, the shorter the wave length, the more energy. The energy that is absorbed by one mole, that is one gram molecular weight of a material can be expressed in kilocalories. As you know, a calorie is a measure of heat. The kilocalorie is just a 1000 times as much so that we are talking here about the absorption of energy in terms of moles which are gram molecular weights and in kilocalories. Radiations can cause a chemical reaction only if they have enough energy to at least equal the activation energy of the reaction. Most chemical reactions require some kind of energy put in them to get them started. There are those that are spontaneous in the sense that they will take place without being prodded in some fashion or another. But there are far more chemical reactions in which you have to heat them or in the case of what we want to accomplish, you have to apply some energy to them in the terms of radiation. The radiation must be of sufficient energy to exceed what is called the activation energy of the chemical reaction and this is why you have safelights. The light that is safe for a reaction means that the wave length is long enough that it doesn't have the energy to set the reaction off, at least in any reasonable length of time. This is why you can, for a modest period of time, handle presensitized offset plates very nicely under yellow light. The composition from which the light sensitive coating is made is kicked off by blue light and ultraviolet, but not yellow. Gold lights are the common safe light. Most thermal reactions, that is, reactions that you can activate by heat are in the range of around 10 to 80 kilocalories per mole. In other words, you have to put that much energy in them to start them going. Now those that have an activation energy less than 16 kilocalories proceed rapidly at room temperature. So that in this range of 10 to 80, if you get down below sixteen, you get something that will go at normal room temperature. Of course, this is not useable as a photographic system, because while many of us don't object to working under red light, or even in total darkness when necessary, I don't think there are very many of us that want to work in a refrigerated atmosphere. Thus, the reactions that are useful must not be set off too readily by heat. Photo systems that are activated by less than the 16 kilocalories per mole are not useable because they will go in the dark. Relating wave lengths to energy, 16 kilocalories is about 1800 millimicrons, which is way out in the infrared. You remember 700 millimicrons was the limit of visible radiation. So one is restricted in the choice of reactions that he can use as photo chemical reactions by virtue of the fact that some of them are just so sensitive to thermal activation that they go at room temperature. The dichromated coloids such as dichromated gum arabic that one uses in deep-etch plates, is kicked off at room temperature. We call it dark reaction. If you coat the plate and let it set around for a period of time before exposure, the coating will gradually undergo a chemical change that insolubilizes it where you don't want it insolubilized. The unwanted change occurs because a reaction is activated at room temperature. You can prevent the hardening by storing in a deep freeze. This is a useful method and illustrates again the type of problem that one must watch for in dealing with photochemical reactions.

The Grotthus-Draper law in photo chemistry is a principle that one must always bear in mind. The law states that only radiations which are absorbed can cause photochemical reaction. If the system doesn't absorb the radiation, it cannot receive energy. If the system doesn't receive energy, it will not be activated. If one takes an absorption curve of a system and finds it does not absorb energy above 500 millimicrons, one doesn't have to run tests on the system to know that a red light would be a safe light. The absorption of energy causes the elevation of one or more electrons to go from a ground state to some activated state. The atomic model that is dealt with most commonly is a nucleus in orbits. The orbits are generally pictured as being circular. The orbital electrons exist in various levels of energy. When an atom takes up energy, one or more electrons are raised to a higher energy level. An electron having a higher energy level can fall back or return to its original level and thereby give up energy. Various things can happen when the atom gives up the energy. It may re-emit the energy at the same or some longer wave lengths. The result is called fluorescence. For example, ultraviolet radiation may be absorbed and the energy re-emitted as a blue fluorescence. Or the absorbed energy may be changed to heat by collision with other molecules and thereby start a chemical reaction. The molecule may dissociate or a fourth possibility is to transfer energy to another molecule which then becomes reactive. This is called a sensitized reaction. Silver halide systems can be dye sensitized. Although the mechanism is not thoroughly understood, the dye absorbs energy that the silver halide system itself will not absorb, and then the dye can transfer this absorbed energy to the silver halide system. Zinc oxide used in Electrofax does not absorb above about 420 millimicrons. Therefore, it would not be sensitive to green, yellow, and red. If one uses a dye that absorbs in the red, such as methylene blue, the dye would absorb the red radiation, transfer it to the zinc oxide, and make it sensitive to red light.

These are some of the aspects that one should have in mind in thinking about photochemical reactions. Of course, it is a very brief and sketchy summary of some of the outstanding principles relating to a topic at which competent people spend their lifetime, and there is still a good bit that we don't know about it. Due to lack of time, I shall have to treat silver halide photography very briefly. I must comment about the unique property of silver halide that makes it unlikely to be replaced very quickly by any other phtographic systems such as photopolymerization or some other types of photochemical reaction. The silver emulsion is made up basically of two materials, gelatin and a silver salt such as the bromide, chloride, and iodide. The silver salt-gelatin emulsion is coated on a support of some kind, either on glass or more commonly on plastic film or it can be coated on paper as a support. When the emulsion is exposed to light, a latent image is formed. This is not a visible image, but it is a formation on the individual silver salt crystals of a spot of free silver. During development, the latent image becomes visible. The mechanism of development is such that you get an amplification of the effect of the light of about a billion times. Theoretically, if you expose one atom on a silver bromide crystal which is made up of a billion atoms, the developer will cause the whole crystal to develop. This is the reason why silver halide systems are so reactive to short exposures. The light reaction must convert only one-billionth of the material. The rest of it can be converted during the development reaction. This is an oversimplification of the explanation, but it does illustrate the outstanding feature of silver halide systems. There is just nothing else that approaches it. That is why you can expose silver halide films with a time equal to the snap of a finger, but a diazo system such as is commonly used on a presensitized litho plate may require a minute and a half in front of an arc lamp.

## COLOR REPRODUCTION

In this last period, I would like to spend approximately the first hour on light sensitive systems, particularly with reference to plate making, and then the second hour on computers and some of their actual and potential applications in the graphic arts. We talked about photography, in which you get the image that you want to reproduce in the form of a negative or a positive. Then this information must be transferred to a printing surface in some manner or other, more frequently than not a metal surface, although plastics are beginning to invade this field. The reason we need light sensitive coatings for photoresists is to convert the film image to a metal image. Photoresists are used for all types of printing plates; photoengravings, offset litho plates, gravure, screen process. Photoresists have several properties in common, and there are various classes of these materials. Some compositions are quite old, that is, perhaps of the order of fifty, sixty, or seventy years or more and some of them are rather recent inventions or developments. One of the old standbys is the group of photoresists called dichromated colloids. I am sure that many of you have worked with such materials as hot top and cold top in photoengraving. You have worked with gum arabic stencils in offset lithography. Some of you, perhaps, have used carbon tissue in the preparation of gravure printing surfaces. All of these are based on essentially the same light sensitive systems. They are all water solution, and there are basically two active components. You have some kind of a gum material. This may be gum arabic in the case of deep etch litho plates. It could be glue in the case of hot top for copper photoengraving. It could be shellac for the cold top for use on zinc photoengravings. The most recent "gum" materials are those that are based on a synthetic polymer known as polyvinyl alcohol. These compositions go under the name of "vinyl top," that is, they may have vin and then some other part of a word, a suffix as it were, selected by the individual company that manufactures them. But the light-activated component in all of these is a dichromate. Dichromates are a family of chemicals. They are actually salts in the sense that they are made from an acid and a base. They are all water soluble. For example, there is ammonium dichromate and potassium dichromate and sodium dichromate. All will make light sensitive systems. The usual choice is ammonium dichromate because of the fact that it is very readily soluble in water. You can make a strong stock solution and then use from the stock solution. Ammonium dichromate is least likely to crystallize out of the dried film. Of course, if you make up a solution and coat it on a plate and when it drys down, if there is a formation of crystalline material in the film, you are in trouble. The ammonium salt is very efficient in the light reaction. That is, it makes material quite light-sensitive in comparison to the others. It is not at all speedy in reference to something like a silver emulsion. So that the ammonium salt is generally the one that is used both in photo engraving and offset lithography. The potassium dichromate is cheaper and it is commonly used in gravure, that is, in the sensitizing of carbon tissue. The sodium salt is not used because it has a tendency to absorb too much water from the air and this leaves you with a softening film after you have coated it. After the materials are made into a solution, it is coated onto the metal plate, whether it be relief or planographic plate and is exposed to the light behind a film negative. During this exposure to the light, there is a change in solubility in portions of the photoresists. Wherever the material is struck with light, it becomes relatively less soluble. This is a matter of degree though, and there is not as sharp a dividing line between soluble and insoluble as one would like to have. If you express this in photographic terms, you would say that it has a low gamma in that the modes change in the amount of light does not make a great change in the difference in solubility. But nevertheless, they are useful materials. They do have some problems, one being that they are, as I mentioned, activated by room temperature condition. And if you coat a plate and let it stand around for a period of time, even in the darkness, there is a tendency for some change in solubility to take place. This is known as dark reaction, for the rather obvious reason that it takes place in the dark. It can become a problem because it makes development after exposure erratic. So that if one wishes to coat a plate and let it stand for any period of time, there are some things that you can do to help. Since the dark reaction is a chemical reaction, it is subject to the same laws as are other chemical reactions; that is, heating makes them go faster and cooling will retard them. So that if you wish to keep a plate that has been coated, one thing that you can do is wrap it properly and put it in a deep freeze unit and you can store it for a period of time. Commonly this is not done for the reason that most people have no particular desire to store a coated plate. You coat it, expose, and go ahead and develop it. It is possible though, to delay this dark reaction by freezing or by dehydrating the plates. Either one will slow it up. Then the light reaction takes place when it is exposed, usually to a carbon arc, although blue-light fluorescent lamps and xenon arc or a mercury vapor arc are all quite satisfactory. The main thing that you want is a source of ultraviolet radiation, because dichromated colloids are most sensitive in the ultraviolet region. They do have some sensitivity in the blue and in the green, but they can be handled very nicely under gold light. There is still argument as to what happens when you expose these coatings to light, at least as far as details are concerned. But it is generally agreed that light causes the change in the dichromate to free chromium ions by one mechanism or another. The argument is over how this occurs, not whether it occurs. And the presence of the free chromium ions then leads to what is called cross-linking. In the talk that I had hoped to give on polymers, I would have explained cross-linking in a little more detail. The materials such as polyvinyl alcohol, shellac, and all other polymers can be thought of as long chain molecules. They are made up of relatively simple units, but it would be very much like taking each of you as a building block in a polymer chain and I would say join hands and we would string out here for maybe a hundred people in length and that would correspond to what we call a polymer chain. So that the polymer molecules may be in separately and they may be the coating intertwined. You might think of it as a barrel full of short lengths of rope if you wished. Now it is quite possible to grab hold of one of these ropes in the barrel and pull it out. This is a crude analogy of what takes place during solubility. During solubility, these chains go in the solution separately. They swell and go in the solution. Now if in some manner or other, we cause what we call a cross linking in these chains, in other words, with the rope analogy--if we tied cross pieces from one rope to another, then when you reached in the barrel and tried to pull them out, you would have to take the whole thing. The cross linking ties these together sufficiently that the solvent, whatever it is, can't get in there and pry one of them apart and dissolve it away. We have to take the whole thing or nothing and the facts of the case are that when you cause this cross linking and the uniting of these chains, you make it considerable less soluble. So that you can put the exposed plate in some kind of a developer. It may be a calcium chloride solution in the case of a gum arabic coating, it could be water with hot top and polyvinyl alcohol, but in any case the solvent distinguishes between what is unexposed and still soluble and what is exposed and is insoluble because it has gone through this cross linking reaction. By this manner, then, you get the image transferred from the film to the metal plate. Then you go ahead with the various types of treatments that are necessary to complete the plates, such as the descumming operation and etching in the case of relief plate, or you have to gum it and ink it and desensitize it and so on in the making of a deep etch plate and you may copperize it if you want to make a copperized deep etch plate. So that these materials, dichromated colloids, are a group of materials of long standing use. They do have problems associated with them such as the fact that they are relatively slow in their light reaction, as you have to hit them pretty hard with ultraviolet radiation to make them go properly. There is the dark reaction that makes them change solubility even in the dark. There is also a problem with what is called continuing reaction. This is a change that takes place after exposure and before development which adds further to the trouble. And then some people are sensitive to dichromate and they get dermatitis. Now there are certain properties that are good. They are water solutions, and this is quite an advantage in many shops. If you want to throw some away, all you have to do is pour it down the drain. There is no fire hazard with a water solution. Probably their main advantage over some of the more modern types of coatings is the fact even on the areas where they have been what we say, insolubilized, they will still be water receptive. Of course, this is a very necessary thing in the case of making deep etch plates, because the area that has the hardened or insolubilized coating on it eventually becomes your non-image or water receptive area. If they are not water receptive, you can have both the image and the non-image area taking ink and you would print a solid all over so that they do have this one advantage. But they are being replaced by a newer class of materials that go under the name of diazo. These are the basis of the presensitized offset lithographic plates that appeared on the market, I guess, commercially in some volume about fifteen years ago. Diazo materials have some rather unique properties. Diazos can be used either on a presensitized plate or the wipe-on type of offset lithographic plate which you coat in the shop simply by making a water solution of one of these materials and putting it on the plate with a sponge or a cloth or you can put it on with a roller. Diazos are commonly used for the negative type of presensitized plates. The name diazo comes from the fact that they have nitrogen in them, and the French word for nitrogen is azote. There are two nitrogens in the molecule, so the prefix of "di" is used. They are usually applied from a water solution, which makes them convenient to use. The feature of diazos that makes them outstanding compared to the older dichromated colloids is the fact that they have no dark reaction or no continuing reaction. No dark reaction means that you can coat diazos on a plate months ahead and store them on the shelf, wrapped normally in aluminum foil to keep moisture out and you can store them at room temperature. I think that most suppliers put about a six months limit on these. Of course, this means that they have probably been in storage in the warehouse someplace. The manufacturer does ask you not to store them over a radiator, because heat tends to make chemical reactions go on that are undesirable even in the case of diazos. Diazo compounds are usually coated on aluminum, although there are other materials, such as zinc that permit making presensitized zinc plates. I don't think zinc presensitized plates have ever been commercialized. Diazos can be coated on paper and make presensitized plates. Diazo plates can be stored over a period of time, and they are relatively unaffected by changes in humidity, whereas the older dichromated colloids change their light sensitivity rather rapidly with changes in relative humidity. The general group of diazos are adaptable to both of these on the market.

One of the more recent developments in the photoresist field was invented, developed, and marketed by Eastman Kodak Co. under the name of Kodak Process Resist, abbreviated KPR. This material is not handled in a water solution, which does present some advantages and some limitations, but rather is coated from and developed in organic solvents. But it has such unique properties that it is finding a place in the field of processing metals, not only in making printing plates, but in doing what is called chemical machining. Chemical machining is a fabricating method for metals and not properly part of the graphic arts, but the techniques involved in doing it are somewhat the same. KPR can be used for photoengraving and for surface plates for offset lithography. It has no dark reaction and no continuing action. In other words, you can coat a plate ahead of time and store it for as long as you want. I don't know whether you could store it ten years with no change but there would be no object in doing that anyway. It takes a relatively short exposure, it is good from that standpoint and you just can't over-develop it. It has what we would speak of as a very high gamma. It it changes in solubility at all, it changes completely. There is just no danger of over-development. It has a real sharp edge to the image. It doesn't require any burn-in in photoengraving so that from this point of view, it is good and it is not affected by humidity. The problem with it is the one of any flammable solvent that doesn't mix with water. If somebody pours some in the sink and doesn't wash it down rapidly and somebody else comes along with a match that he didn't put out completely and uses the sink as a receptacle for a hot match, you can have problems. But you can get into trouble with most anything if you are careless about it. This is no real disadvantage; it simply means that you have to use it according to the properties that it has. It does afford another type of photoresist that has properties different from all of those that appeared on the market up to this time.

Now I would like to turn to a light-sensitive system that is different from these in that all these are used as a surface coating to make a metal plate. In other words, with dichromated colloids, diazos and KPR you put a thin coating on, you dry it, photoprint it in a vacuum printing frame, and develop it and then go ahead and etch the plate or treat it in some other fashion. About ten years ago, Dupont announced their photopolymer printing plate which has the trade name of Dycril. Dycril plates are basically an etched plastic plate, although the word etch is not commonly used with plastics. We speak of etching a metal, but if we do the same thing to a plastic somebody will say it is a washing-out process, that is, you are simply washing the material away. The Dycril composition is light-sensitive in depth, and this makes it unique. In all the metal plates, there was a light-sensitive coating only on the surface. The metal itself was not light-sensitive but the Dycril plate and the photopolymer plates, in general, are light-sensitive in depth. Incidentally, this is not the only photopolymer plate that has ever been researched. It is the only one that is commercially available in this country at this time. The Germans have worked on them and there are other laboratories in this country that have worked on similar types of materials where the plastic is light-sensitive in depth. Photopolymer plates have a supporting layer, which is commonly metal, although not all the time. Some have a plastic film for support. Then coated on the support is the light-sensitive polymer or the light-sensitive layer which is sensitive all the way through. The longer you expose, the farther down in depth you will harden it. When you receive the plate, it is made up essentially of polymer chains that are not linked together. They are free to move individually and they are soluble. When you expose it to light, there is a cross-linking takes place; it changes the solubility and the unexposed material is washed away. If you have had experience with these or read about them, you are aware of the fact. Usually, Dycril plates are conditioned by storing them in an atmosphere of carbon dioxide for a period of about twenty-four hours. The reason for this is that as the plates set open in the air, oxygen from the air gets into the plastic layer. Oxygen slows the light reaction. Oxygen is an inhibitor, and unless you get the oxygen out of the plastic, long exposures are needed. When you expose, you get a hardening in depth. A washing out of unhardened plastic in diluted alkali forms the raised printing surface.

I have a sample here of a Dycril plate that you are welcome to inspect. The uses of this plate are still being explored. It is used for direct printing on regular letterpress, both flat bed and rotary. One of the hopes that they have for it, of course, is the use in letterset printing, which is a word that was coined a few years ago to replace what people used to call dry offset. The term letterset comes from the fact that a letterpress plate is printed by the offset principle. As is frequently the case, part of one word is combined with part of another word to coin a new word. In addition to use in letterset printing, Dycril is used for a pattern plate in making the matrix for duplicate rubber plates or plastic plates. The molder must be careful, because heat and pressure tend to distort the Dycril plate.

One of the claimed advantages for photopolymer plates is that you can make them more accurately than metal plates and consequently you have little or no makeready on the press. I think there is a basis for this claim, but I don't believe that you can take it as 100 percent truth for every type of image on every press that is now in existence operated by anybody that wants to come along and push the button. As you well know, there is more to getting a good impression than simply slapping the plate on, throwing some ink in the fountain and pushing the start button. There are occasions when you can improve the image by some makeready. But, generally speaking, I think it is a valid claim that with the photopolymer plates you can get under way and get useable material in a shorter period of time and with less waste than you do out of many of the older styles of metal plates. They are very readily adaptable, of course, to the use of photoset type and you can make combination plates easily. There is no difficulty at all in etching 120 line screen along with large type on the same plate. They do not have press life equal to metal plates. You will hear that you can run these for a million impressions. That is quite true, if you have only type matter and if your pressman sets the press properly and you don't print against abrasive paper and your ink doesn't attack the plate--you can print over a million. But if you take halftone at the edge of the plate then you've got something different that may wear more rapidly. I don't want to be in a position of knocking the photopolymer plate, and yet I think it is only fair that one look at both sides of the question, because this matter of plate-life is so much involved with the nature of the image and the press that it is run on and who operates the press and the paper that is used. It is just very risky to try to put very definite limits on what you can do. There is another plate here that you are at liberty to look at during the break. This is the Kodak Relief Plate, a thin plate adaptable for wrap around relief printing, particularly letterset. It is competitive with Dycril, copper and zinc-aluminum laminate. The Kodak Relief Plate has a metal supporting layer, a plastic layer and then on top of this is a very thin silver-in-gelatin emulsion. The total thickness is around 0.030 of an inch. The metal layer is about 0.012 of an inch and the plastic layer about 0.018 inch in thickness, which is enough depth to print from by letterset or dry offset. There is an exposure of the silver-gelatin emulsion through a negative and then a hardening development. After development, you have a solvent-resistant layer that protects the plastic layer very much like the photoresist protects a metal. Then you simply use a solvent and brush to wash away the plastic layer where the plastic is not protected by the gelatin layer. This leaves a relief image. The KRP plate is still undergoing revision and improvement as is the Dycril plate. I think the KRP plate finds more use in the relief offset or letterset operation than it does for direct printing at this time. The plastic surface is not so wear-resistant as metal plates. But again, this is no real detraction from it because one might say that presensitized offset plates won't wear like a deep-etch plate which won't wear like a bi-metal plate. This is true but not everybody has to drive a Cadillac. You can be quite comfortable in a cheaper car that will do the job for you and the same thing with these other plates. If you want a plate that only runs 25 or 50 or 100,000, you don't want to pay for making one that runs a million. So that the net affect is that all of these will undoubtedly find a place in the market of plates for wrap-around printing and the other processes.

I always look rather askance at these announcements that here comes a new plate or a new process that is going to obsolesce everything that goes before. The printing industry is made up of too many different kinds of markets to have this happen, in my opinion, very quickly. Almost every job seems to be different. Don't throw out all your hot metal because it is going to be useful for a while yet, even though the new phototypesetters can generate 20,000 characters per minute. Not everybody needs that kind of capacity, or would know what to do with it if they had it. So that printers will still be making plates with dichromated colloids even though these newer things have come in. I would like to get to one more photosensitive system very briefly before we have the break and that is the Kalvar. Kalvar is a line of light sensitive materials that has come over the horizon in the, perhaps, last five years. They are based on a rather unique principle and I think maybe if we had the screen down and the projector on, we will give these a quick treatment. The unique part of the Kalvar system is the way that it block light passage. It does it by light scattering. During the processing of Kalvar, there are formed within the plastic film small bubbles of gas, largely nitrogen, and the light is scattered wherever it tries to come through. Light rays hit an interface between the plastic film of the material itself and the gas bubbles that are formed within the film so that the light gets scattered and the eye can't pick it up. Whereas with silver halide film, the silver particles simply absorb the light and dissipate the energy, probably as heat and the eye doesn't see it.

While there is much more to be said about these systems, I do want to get over into some comments on computers.

I would like to get started by telling you some of the things that I have read of and talked to people about as far as what the potential of computers might be in the graphic arts, specifically with relationship to their applications in graphic arts technology. I know that they are useful in graphic design and in engineering graphics and so on, but I am not a designer and don't want to get into that field but the fact that I don't mention it doesn't mean that I am completely unaware of the fact that when we say graphic arts there is also the design aspect and that computers quite likely will be another tool to use in design. Basically, a computer is a data processing machine. You might define it as a machine that can accept input data, process these data and then provide the results of the processing. And the great virtue of them is, of course, that they can do a complex or repetitive mathematical and controlled task. They are extremely rapid in their performance of the assigned task and they can do things in seconds that would take people with slide rules and ordinary desk calculators literally weeks to do. But they do operate under some constraints. The task that you want them to do has to be well-defined and it has to be stated in mathematical terms and it must be completely and precisely specified. In other words, you have to have a good program, the results you expect to get cannot be any better than the program and the information that you feed into it. An argument that one can get into when he talks about computers is this question of whether they can think. And I don't propose to try to answer that question. I will give you some of the comments that experts on both sides have written and spoken, and then you can make up your own mind whether you believe a computer can think or not. I suppose the crux of this argument is what do you mean by "think." If it is a matter of decision making, certainly computers can simulate thought processes as far as decision making. Because most of what we do when we are thinking is simply sizing up alternatives and making a decision on the basis of what the prevailing conditions are. Like you might sit down and say--well, where shall we go on our vacation this year. And you begin to think about the things that you have to take into account when you make a decision. Where can you go? Shall we go to the mountains? Shall we go to the seashore? Shall we go to New York City? Shall we go to Hawaii? Do we want to go to Europe or shall we just stay at home? How do you decide? Number one, how much time is available? If you only have a week, your decision will be influenced and you might do something different than if you had two weeks or a month. How much money is available? This certainly is going to enter into what you do. Where have you been before, where did you go last year? Do you want to go to the same place or do you want to go to some place new? What transportation is available? Well, right now if you had three days to take a vacation, you certainly wouldn't plan on going to New York City, because you would never get there and back by rail. These are all facts that you feed into your brain, so to speak, and you come up with an answer. You simply tell it that if we don't have at least $1000 to spend, there is no use in thinking about going to Europe by plane. And when you ran the program, it would look up in the memory and it would say--well, there is only $800 to spend and the program says that if there is only that much, then the answer about going to Europe is no. So it can take information like you feed in your own mind and it can make decisions. Another example is the perpetual one that housewives face--what shall we have for dinner? What is in the freezer? This is one of the bits of information that you feed into the computer. How many people are you going to feed? If you have a package of only six porkchops you are not going to use those if you have ten people coming. What are the personal likes and dislikes of those that are going to be present? What did we have yesterday and how much time available is there to cook it? If it is already five o'clock there is no use getting a frozen roast to try to prepare it for a seven o'clock dinner. You can take the proper kind of information like this and write it into the program and you can stick whatever data you want into the memory of the computer and run the program through and it will come out with an answer to what you ought to have. So that there certainly is some reason to believe that computers can be programmed to simulate decision-making processes, as long as we stick with, let's say, the judgment by brain or fact. We frequently hear that so-and-so let his emotions get the better part of his good judgment, which means that he made a decision not based on what we would commonly call the facts of the case, he got his emotions mixed up in it. And as long as you are dealing with decisions of the brain, I think there is a reasonable chance to say that computers can simulate decision-making processes. If you get over to decisions of the heart, where you let the emotions get mixed up in it then you are away from something that a computer can do, I am sure. Because you can't make a computer operate by hate, love, or threat, etc. You can't go to it and say--now if you don't perform in such and such a manner, you can't have the car to go out tonight. It couldn't care less. So that when you get this question of can they think, it is a matter of what you mean by think. Certainly there have been programs where computers can analyze their own performance, they can diagnose their failures, they can make changes that enhance their future effectiveness, they can discover proofs for theorems in logic and geometry. They can be taught to play chess, design motors, compose music and other tasks. Now, this isn't a matter of can they do this, there have been programs written and they have done it. So whether you believe a computer can think or not, I will leave up to you. No matter which way you decide, you will be in good company because there are brilliant and capable people on both sides of the fence on this argument. There are those that call them an idiot machine and there are those that call them a brain and the truth probably lies some place in between. But their capabilities have not been fully explored, I am sure, and we will just have to wait and see what shows up. But under any circumstances, they can perform certain functions such as what we might call read or receive information. They can write or send out information. They can memorize; they have a marvelous memory. It is almost infallible, but not quite. They can perform basic arithmetic. Their virtue is that they can add and subtract very rapidly. They can perform basic logic functions. There are two types of computers; the digital which works on the principle of discrete units. That is, if you want to add two beads and three beads and get five beads you are doin it by digital method. The digital computer can perform mathematical functions very, very readily, extremely rapidly. That is one of its characteristics. It has very high precision. It isn't unusual for a digital computer to give answers in twelve digits and this is extreme accuracy. You can also build error-detecting units into it. That is with a digital computer you can have a check on itself and if it makes an error, it will very likely pick it up so that the digital computer is one that is most commonly thought of when somebody says computer. The other general type is the analogue computer, which as the name implies, operates by using the analogous method. If you wanted to add three and two on an analogue principle, for example, you might cut a piece of paper two inches long and a piece of paper three inches long, you lay the two of them together and you measure the total length and it comes out five inches, so that you conclude that two plus three is five. This is adding by using an analogy. And the voltages, the electrical circuits are used in analogue computers that have the same mathematical expressions or the same differential equations as the system being studied, so that you measure, let's say in terms of voltage, for example. Voltage is being analogous to numbers. You may measure in terms of current, but the limitation on accuracy is that you can get no better accuracy than the instrument that you are using to measure. If your voltmeter only has an accuracy of four digits, there is no possibility of getting any better accuracy than that so that the analogue computer does not have the accuracy that the digital computer has. And then, of course, the third classification is the hybrid computer, which is a combination of digital and analogue, but perhaps the easiest way to remember the difference between digital and analogue is that the digital asks how many, the analogue asks how much.

Those are the types classified as to their general electrical make-up, but you can also classify computers in using other criteria. For example, there are special purpose computers. These are computers built to do a specific job. For example, you might buy a computer to do typesetting, and you would buy it specifically for that purpose. And you would be able to get capacity for typesetting that would be cheaper than if you bought another kind known as general purpose. The special purpose computer is frequently cheaper but it is not as flexible. The other class would be the general purpose computer, which can simulate any special purpose machines and the single machine can do many tasks and they are readily available. For example, if you had a large company and you were considering the installation of computerized typesetting, one of the things that you would want to take into account is whether you also want to do accounting, such as payroll. If you did, then perhaps the sensible thing to do would be to consider a general purpose computer. You could program it to do your accounting work and you could also program it to do typesetting, but you would pay for this additional flexibility, in a higher initial investment. Somebody else may already have a computer that is very much on office work and want to do only typesetting, so he might go to a special purpose one only for typesetting, and thereby meet his needs at a somewhat lower price, but he might have to wait longer to get it.

There are basically five parts in an electronic computer. There are the input and the output. This is rather obvious. You must have a memory system where you are going to store the information that you want to use. You have to have an arithmetic unit to do the addition and subtraction and then you have to have control unit that provides control over all of these operations. Thus, a computer has an input unit, an output unit, a memory unit, an arithmetic unit and a control unit. These units are worked under the direction of the program as written. The function of the input unit is to convert numerical signals to the type of electrical impulses that can be understood by the computer. At the present time, it is not economical to take ordinary typewritten numbers and try to show it to the computer and say here, take this information and work on it. You can use a scanning apparatus that would do this, but optical readers are expensive. It is much more common to get the information into something like punch cards or punched tape or magnetic tape and feed this into the computer. Similarly the output is very likely not to be a readable language so there has to be a conversion process. The memory unit stores data. The arithmetic unit does the mathematical computation and the control unit keeps track of the whole operation.

Electronic devices only have two stable conditions, either on or off. This means that we need an information system based on only two characters and this condition is very nicely met by the binary number system which uses only zero and one. Most of us learn the decimal system in school, probably because we have ten fingers that we can count on. Anyway, we normally learn on the decimal system. But this is not a satisfactory number system for some machine operations. It is better to have the binary system, in which there is only zero and one rather than zero through nine.

There are a number of aspects to the use of computers in typesetting and one of the comments that one ought to make is that at the present time it is the economics and not the technology that limits what can be done. If you are willing to pay the price, you can get a typesetting machine that will do practically anything you want it to do, including the page make-up, but you have to be pretty well supplied with money if you are going to do this. Some other aspects of this field of computerized typesetting other than the simply technical part is that some companies look askance at it because there is no way acceptable to the authors to get proofs out to them. The output comes out frequently simply as typewritten material where the author can't tell whether the italics are in the right place or some other things that he is interested in. If you get a problem with an author that wants an honest-to-goodness galley proof to look over, then you may have some difficulties in getting it accepted. There are other aspects of it that there aren't time to go into. Computer composition certainly seems like it is going to expand in use, particularly for newspapers and book manufacturers where so much of their work is pretty much straightforward composition, which can be a very readily defined task and the computer can do quite well at it. There are a number of companies that are in it and have been in it for some time. Few, if any, of them yet think that they are making money at it, at this stage, but nearly all feel compelled to stay in computer composition because the long-term prospects are promising. When they get proper programs written and debugged, and get the rest of their printing operation geared to the computer, in the long run they will be successful. But this introduction of computers into typesetting is not simply a matter of interposing a computer in one stage of the whole reproduction process from the copy that comes in to the time that you go on the press. You can't simply take an old system and stuff this new technique of computerized typesetting into it without making changes both before and after, if you are going to get really the type of success that one must get out of one of these expensive machines in order to make them pay out. So that it means better ways of putting information in and at the present time, manual keyboarding is the most widely used. There is hope that optical scanners will relieve some of this, but every time you add auxiliary equipment, you add tremendously to the cost and it becomes a question of economics. Even though computerized typesetting is technically feasible, if you can do composition more economically by using conventional machines, you are better off to do it in the way that suits your operation best. The larger companies will of necessity be the ones that get into this first. There are growing up in some cities service houses where the smaller plant simply rents time, maybe a few minutes a day, on a computer and can get their production out in a very short order and not have to bear the expense of keeping the computer on the payroll, as it were, twenty-four hours a day. The rental on computers is fantastic. It is in keeping, of course, with the work they can produce. But there are very few plants that are of the size that could keep even a modest size computer busy on typesetting all the time. So that all these things have to enter into the decision on whether to go into computerized typesetting. There are a number of unanswered questions. I suppose there will be for some time to come.

# CONSULTATION

## by VERNON WELSH

Vernon Welsh of New York City is consultant to General Dynamics, CEIR, Boeing, Allis-Chalmers, Combustion Engineering, and Matrix in problem solving areas of communication strategy, organization and management of the communication function, basic policy speeches, and presentations and proposals. Before 1960, Mr. Welsh was Vice-President-Communication for General Dynamics Corp., responsible for policy determination and program direction of all corporate and divisional advertising, public relations, publications and graphics. Mr. Welsh had previously been connected with General Electric Company and Geyer, Newell & Ganger, Inc. He graduated from Dartmouth College with an A. B. degree.

### LECTURE 1

This morning I was checking through the Bible looking for a moment of inspiration and the first sentence I came across was "Lift not up your horn on high." Unfortunately, I am going to have to lift up my horn a little bit and tell you some of my background, in detail, for only one purpose: If I am to be your consultant--and I would like you to regard me as such--you need to know what it is that I know, where I have been, and what I have been doing so that during this period we'll have together, beginning today and going through the week you may tap my experience, to probe me for the answers you may need for the solution of your particular problem; to get everything out of me that you can possibly get. In the role of consultant--which is that of a person engaged in a joint deliberation with you on a mutual problem. I would like to emphasize the non-lecture aspect. I don't feel that I am here to give you a reading nor to lay down arbitrary rules. I would like to ask: "How can my experience relate to your particular problem?" In this case, I would need to know a good deal of what your basic problem is with respect to your purpose for being here this minute; and how a discussion of communication in a business organization, or a number of organizations, can further your objective which, I gather, is the development of a broader gauge curriculum than has been the standard in the past. This is the basic reason for asking for feedback as free as possible on the questions that may be in your mind as we continue our dialogue. There isn't any point in adhering too rigidly to an outline nor of restricting ourselves to literal interpretations of "communications." If we want to get over into aspects of communication that are not directly related to the business organization, I think we should feel free to do so. And if we want to talk of socio-economic manifestations of breakdowns in communications, say the Watts community in Los Angeles or current riots in N. Y., this may be very pertinent to our problem of exploring the communication process. So, in presenting my record for your inspection I would simply like to have you regard it as a kind of index or content outline to a resource in my person that is available to you during the week. I shan't be always able to project a definitive statement or theory. I would like to have a response from you--I would like to have you tell me what your objectives are, what your problems are in teaching your communication system. In this sense, for instance, if I were talking at Boeing--which I have been doing pretty steadily for a couple of years now on certain phases of proposal presentation to a group like this--the problem would be furthered very considerably by that engineering group or that graphics group saying: "Here is what we are doing. Will you critique this for us?" Now that doesn't mean that the consultant is a very special person with knowledge they don't have. He happens to be a person of some professional experience in the field who is going to give an outside viewpoint; an off-angle slant that will illuminate--they would hope--some aspect they may have forgotten. I will be very happy to critique your program if you will tell me what it is. I would like you to feel free to consult with me. If, after the seven or eight weeks that you have been embarked on this course, there are questions you don't have the answers to; or if there are problems with respect to certain phases of communication that annoy or irritate you; or which you challenge, I would like to know what they are; if I may do so purely on the basis of: Here is an outsider with fairly broad experience who may be able to bring to bear a different point of view or throw a different light on what it is that we are jointly trying to do. If we run into dry periods during the session, I would be very happy to discuss the "theater of the absurd" or the unsafe automobile; even Marshall McLuhan, if you would like, until we are refreshed and I can go back at our sort of straightline business. In the biography that I submitted the other day, I had listed my birthplace as Philadelphia, Pennsylvania; education at Dartmouth College; and family as married and four children. But I thought perhaps I should have put the "marriage and four children" under education rather than under family. Certainly the family is the place where communication is practiced or non-communication is in effect and this is where we learn the very first basis of the art to which most of us are dedicated, in one way or another. I don't plan to talk too much about books; but I would like to know what it is you have read if you will just scribble it on a piece of paper or volunteer from the floor. Pertinent also might be the films which you have seen. Certainly the television programs with which you agree or disagree or which you yourself critique just as family people sitting around looking at it. The reason that I don't believe in talking too much in too great detail about books--and I realize this is rather unacademic--is that reading is pretty much like food. Some people can remember in great detail meals that they have eaten. But the purpose of books and films in the educational process is not to be remembered as a gourmet remembers the dinners of a Lucullan Society but to get out of them what it is they have to offer that feeds and sustains you; that are inspirations to you as creative people [because you are all creative people in the communication art]; and how this substance contributes to the building of your bones, and muscles, nerves for those particular purposes to which you are devoted. I can't remember too many books that I have read and I think it is because one can totally absorb a book and then forget the contents; yet the net of what that writer was trying to do has nevertheless become a part of your bloodstream and a part of your nervous system. Therefore, I don't propose during our conversations or our joint consultation to show any films or any slides. I will have some exhibits which can be seen in the hand or pointed out or be passed about. The reason I do this is not because the slide or the motion picture is not a good medium, not good media. It is simply that probably during the course you have seen hundreds or even thousands of slides and prints. I should like to address myself to you in my comments and have you address me as a professional, for you are professionals. The criterion, the mark of the professional is that he is first a thinker and a visualizer. Everything in the communication arts begins inside the skull. Everything is on the stage of the intellect; in the theater of the mind; in the camera of the brain. And it is out of the heart and of the hand. The true visualizer, the true practitioner of the communication art is always a "hand-and-heart-and-mind" person. A great deal of modern technique or teaching of techniques is wholly devoted to attaining a facility and a skill in a certain art, whether it is writing or production of film or engraving or typography or design; there is a tremendous emphasis on the technical ability and the skill. And I assume from reading over the course you have had during this summer, that you must be pretty well saturated with discussions of skills and facilities and techniques.

And so if I may--under the general subject of communication and specifically communication in the large business organizations--I would like to suggest that: Communication starts in the mind and in the heart and in the hand; and that we need to visualize; we need to see what we are talking about [as professionals] clearly, in the mind; and feel strongly in the heart before we transmit these thoughts, or ideas, or manipulations, or promotions; before we transmit them into the media at our disposal. I would say that I profoundly believe that the medium is not the message. And therefore I don't feel we should miss too much the static slide, or the fixed purpose film, or the set design. We have the group competence to begin to originate some material here; and the mind, and the notebook, and the blackboard, and the dialogue should suffice. I would like to feel that the purpose of these sessions is to liberate the mind; not to nail it down. I distrust somewhat the philosophical method or the scientific method that catches a butterfly and pins it to a board and then says "these are butterflies." Or that nets birds, stuffs them, and sets them on branches and then lectures on the poor dead, stiff, fixed, and immobile objects and says, "these are birds." Of course they aren't birds; they are merely simulations of birds because they neglect the chief characteristics of the bird--flight and song. I would hope then that we might try here to supply somewhat our own material and to express ourselves freely in a creative and original fashion as we go through our sessions.

I became very interested one time in extrasensory perception. This was when I was with General Dynamics and we were exploring all the possibilities of communication; I had been naturally interested in it anyhow for some time. I went down to see Dr. J. B. Rhine at Duke University, the foremost practitioner of this science, some people say "fraud." I found Dr. Rhine to be an extremely interesting person; a very genuine, sincere man who felt that he had [at least in the metaphysical sense] left his bones to dry in the desert as a pioneer in a field he didn't clearly understand which no one else did either. And after listening for a considerable period to Dr. Rhine and his associates talking about clarivoyance, telepathy, and ESP, and looking at the cards with the little stars and wavy lines and triangles that one has to get visually as another fellow deals them out, and all the statistics that went with it --I said, "You know, it seems to me that you are somewhat like people seeing a pigeon on the grass and throwing a net over the pigeon and taking it into the lab and putting it in a cage and watching it for several weeks and then writing a report that says, "This creature can't walk worth a damn." Dr. Rhine was always cordial, even after that, but I didn't feel that I was en rapport with the staff. However, this is what sometimes happens, this is the sort of limited interpretation we sometimes make in attempting to fix the communication process or to say, "This is the way this creature (communication) operates." We may be neglecting the real attributes of the communication process, its real potential and its real possibilities. After we have confined it in the laboratory and watched it limp around in the two-foot high cage we may conclude that it doesn't fly at all and can't walk worth a damn. I am trying to get across the idea that the total communications process has got to be looked at with a feeling of liberation, a feeling of freedom, a feeling of exploration; a feeling that possibly great delight and great power are at your disposal if you integrate all of the functions that this creature, this force, possesses and direct them to a special end or purpose.

My introduction to communication really began in an advertising agency at college where we were able to collect fifteen percent from the publications and fifteen percent from the client making a total of thirty percent which was somewhat better than most advertising agencies can do in the current commercial world, where fifteen to seventeen percent is the top. This experience was useful because everything that was wrong--that could be done wrong --was done wrong. It wasn't until I had begun to work for the General Electric Company as an appliance salesman in a very difficult period of our history --about 1932--that I really began to understand the fundamentals of communication. I am taking this long way around simply because I want to establish the basis of business communication. You learn an awful lot by getting right out on a firing line and actually making contact with people. You find out that what is in the book may be so, or may be partially so, or may be totally untrue. Probably the first thing I learned about communication --in the process of selling refrigerators and vacumn cleaners and washers from door to door--was that you don't go into the front door. You go in the back door. And the reason that you go to the back door is because the woman is not in the front of the house during the early part of the day. She is out in her workshop. She is out in the kitchen and she is doing her work and you can ring that doorbell--door to door selling is not a currently popular thing but the point bears on what we have to discuss--you can stand forever at the front door and she isn't going to come to it. But if you go around the back door, you will find her at work cleaning or washing or cooking; and this is where you can make your pitch.

Now the correlation is exact. It means that in all forms of communication you don't ring the bell where there won't be any answer. You've got to make the effort to go around back; and find out where the access is, what the access is to the person or persons or group that you want to interest. And when you get there you have the opportunity to begin the communication, begin the dialogue that can lead to an ultimate resolution of what it is that you want to sell and what it is that your customer wants to buy.

Communication in a business organization, business corporation is not a free association; it is not something where events just happen as they do in the "news theater" where people come together without thought, without actors, without script and someone climbs a rope and the group then acts as they wish or see fit and you have a "happening." Business communication is not a "happening," it is a calculated, directed enterprise with specific objectives in view. This does not mean,however, that there cannot be infinite variations and change and movement within restrictions. One learns from doing these simple things; and so you go to the back door, to the familiar place where the customer is and then you talk. After about two years at General Electric--during which the remuneration was not very solid to say the least since this was the time of the ten cent movie--I was fortunate enough to move into the job of copywriter at the Campbell-Ewald Company which handled a great deal of General Motors and U.S. Rubber advertising. They also handled the Chesapeake and Ohio Railroad and the symbol of that railroad was a cat. It was known as "Chessie." Now in looking way back to this era of, say 30 years ago, I am impressed with the archaic nature of it; it is almost an archaeological exploration. When I look at the old proofs I wonder, "how the devil could one have ever thought these were really top-notch or great advertising?" However, one of the fresh ones is the image of "Chessie" the cat. "Chessie" was thought up by a very wise man who understood that the basis of the advertising that moves large masses of people to action--the communication that gets results--is what he termed the "F principle," the "F" for familiar. One might ask, "how the deuce does a cat sell a railroad?" But "Chessie" is a perfect example of a powerful communication technique, of what one needs to do in business communication to hook into the mainstream, the jetstream of human emotion, human interest, and desire. This, again, is going to and through the back door, going to the "familiar" place. This is moving masses of people to action (or to have a favorable attitude toward something) simply by appealing to what it is that they respond to normally as human beings. So "Chessie" --I believe she has, after having several kittens, retired--introduced me to one of the basics of advertising. I would say that some of the early things that one has learned as a salesman--simple things like--state the advantage; demonstrate the proof; demand the action--may seem trite catch words and clever phrases but they stick with you because they are basic. Going to the familiar, to the "F principle" is a basic of business communication. As you analyze, as you look at business communication during the next few days [and I would like you to bring in examples of business communication for our discussion] you will see the use of the "F principle" again and again and again. In this early stage of the advertising business, there was an opportunity to do a great deal of tradepaper advertising for the United States Rubber Company; hard and almost rough stuff that sold goods and moved purchasing agents to action. That was an important part of learning about the business communications process. Business communication is linked to the purposes of the corporation: The projection of the corporate image and the corporate personality; the eminence of the corporation in the financial market place; the sale of merchandise or services ; the movement of goods and the flow of cash into the corporate treasury. These are the specifics of the corporate communication process. There was also at that time, at the beginning of the World War II, a very great opportunity to find out what happens when masses of people are exposed to the force of communication ideas or the communication process. It was possible--by discussing problems of interest to the whole country at that time, the purpose of the war, the fighting of the war, and the part that industry and the economy and the community played--to find out that there was often a shockingly powerful response to a simple message presented through newspapers or magazines or radio (there was no TV). This sudden, tremendous reaction of the general public when it is interested in something, aroused by something is--to the practitioner of this particular art--always a fascinating and somewhat awesome demonstration of power. This sort of thing continued during another association, with the Geyer Company where I spent six years as I had in the Campbell-Ewald Company and where, in response to a series of advertisements for what is now American Motors, dealing with the general public problem of participation in the war effort at that time, we received over a million letters. This is incredible even to one who was in the middle of it. But what I am getting at is again, this tremendous responsiveness, this huge force that exists in the community and in the state and in the total nation. This force is responsive to manipulation. Now I would like to be very careful here because there seems always about the advertising man or the communication practitioner, not so much of course, to the solid people who set type and who have the dirty thumb--not so much to them, but to the writers and to the artists and the designers--there seems always to be a slight aura of the con-man, the promoter, the slickster, the manipulator of people's minds and of people's emotions. And when we look at the television programs, at some of the print media, we see regrettably that this is so. And we must be very careful, that is the practitioners in the business must be very careful in their early decisions to move into business communication that they do not succumb to being extraordinarily, extremely bright for brightnesses sake and cynical and shrewd in the unethical, illegitimate manipulation of people to ends that are not desirable. When one sees this enormous response of the public there suddenly comes the feeling that you have a responsibility here to people as human beings who must not be wrongly interested or manipulated. I must confess, too, that at that time we had an advertising program for a whiskey which was known as--which went under the general emotional label of the "Man of Distinction." It may have phased out of everyone's consciousness at this point but I recall that what we came up with was what looked like a great dane standing before a mantlepiece, holding a glass of Calvert and soda in his hand and the label on this fellow was a "Man of Distinction." We went through the whole series of the "Man of Distinction" in various phases of human activity: Architects, engineers, promotion people, airline presidents, tailors, and others. This did two things. It moved 400,000 cases of premium whiskey per year, which hadn't been done before. And it brought out the worst in our respondents who, ranging from captains of industry to university professors, asked, "Why not me for your next Man of Distinction?" We even had one fellow who really was a slicker, I guess; he promised to deliver Albert Einstein if we would contribute $5000 to Dr. Einstein's favorite charity. We never pursued this because we didn't believe him. It was too incredible and we didn't want it to be true anyhow. As hard-boiled as we were and pretty cynical about motivations, that was going too far. I look back at these things with some chagrin and I think that here you have a pretty good example of techniques triumphing over good will or ethics. I suppose whiskey is a useful thing, but I just wonder. I keep thinking about this campaign. Was this an unfair manipulation of the public mind and the public consciousness even though judging from the responses, the public wanted--some of the public wanted, anyhow, to play this game. I distrust this sort of thing and I keep coming back to this because one of the things that I would like to have run through our discussions as a thread is--"intent-and-content." Now technique is a thing with which you are all familiar. But technique can be utilized by anybody; by ministers; or priests; or by the con-man; by a hood; or by the enemy in a national or international conflict. Technique is impersonal, it does whatever the master tells it to do. Technique is like the hydrogen bomb. It hasn't any conscience in itself. It isn't evil in itself; it is simply there and can be used by good men or bad men. The important thing in business communication [even though this may seem a paradoxical statement, the important thing for students to learn, for teachers to learn so they can teach in turn] is the intent of the program. What is the intent of your strategy? What is the content of what you are saying? And after 30 years or so in this business, when you have been through all of the techniques or virtually all of them, and have become skilled in one or more I think that, philosophically, you get back to the question: What does it mean? What is the purpose? What is the intent behind what you are doing? I would think that as teachers the prime thought that should be in the back of your minds--if I may suggest this without being arbitrary and I would like to have your comments on it--is what are the motivations of your students? What kind of person are you going to let loose in the business world with these skills in the use of which some are extraordinarily, fantastically gifted. These are weapons or they are tools. It might be well to keep in mind as you teach your courses and as you begin to mold these people, the matter of character as well as that of technical facility. We have this problem throughout the whole educational world. The question of how high can the marks be regardless of what the character of the person is. Perhaps the educational system has failed somewhat in insisting on technique, technique, technique, facility, brightness, high marks, knowledge at a limited level; and after that no concern with the character of the student at all. If he can score 700 on the College Entrance Board Examinations it doesn't matter if he will also spend his vacation on the pleasure beaches of St. Petersburg, Florida in a useless dissemination of his intellectual, emotional, and spiritual resources. Intent and content, character and motivation are equally as important as, if not more important than, [really more important from the philosophical point of view] than the technical facility itself.

While the advertising business in many ways is a tremendous adjunct to a business communication, it is also a boy's game. I say this to you as mature people and as teachers who have the problem of shaping young minds and young imaginations. Advertising tends to be a boy's game because it tends to be limited strictly to the movement of material goods and services to transitory ends. However, this does not mean that the boys and the girls in this game are not exceptionally smart, very shrewd, very talented and very wonderful people. They are. I say it is a boy's game only because at that period I had stopped being a boy, I hoped, and thought that I should move directly into some of the problems--some of the communication problems that affect our whole profession. And I moved then from an advertising agency ---from the advertising business, where I had felt that I had only begun to wake up to what was really going on around the world, into the task of being employee-communication manager for the General Electric Company. This was a very startling and shocking, turning back, as far as I was concerned, both in income and in scope and really in creative expression. But again, looking back on it I think it was a wise decision simply because it was an education in another form of our communication business. At that time, General Electric was engaged in a colossal struggle to retain its control. There had been a strike in 1946 and this was something that they had predicted could never happen. The supervisors at all levels, and the managers had said, "My employees will never walk out on me." This meant that they did not know what their employees were thinking and they did not know the force of the organization to which they were opposed. This was a complete breakdown, a failure of communication and as such it is of interest to us in our consideration of business communication. The question was--who would control the company, really? I mean, the union or the management. At that time there were two organizations, although initially The men in these organizations were, as usual, extremely brilliant, skilled people who knew a very great deal about the running of a company and a very great deal more about how one manipulates people by communication techniques to take effective and dramatic action. The question then was how could the General Electric management retain control or get back the control of the company to which it was legitimately entitled. Under the laws of the United States, G. E. was in business for profit, employing 250,000 people all over the country and in many places in the world and it was the property of its stockholders. The company hired at that time a man named L. R. Boulware. He had been sales manager of Carrier, the air conditioning manufacturer and also for one of the big washing machine manufacturers. His purpose was to head up an employee communication program that would first, provide an effective confrontation of the union leadership by the company management, and second to educate the employees as to the company position and to seek, really, to persuade the employees to understand somewhat the company's point of view. I think it is important to give you these case histories because I wish to deal here with reality and fact and not with academic comment or book-learning. I will look at your questions about these companies or the meanings of what we were talking about. Employee, union, and community relations was the general term for the department; and my responsibility was Employee Communication. This was at headquarters. This meant that I had direct supervision through a very competent staff of the General Electric News - some 30 different newspapers with different formats ranging from simple mimeographed sheets to weekly papers comparable in every respect to the finest weekly newspapers in the United States. Part of our program was concerned with

presentations, tours, and shows, executive and employee motivation programs to cut down waste and spoilage and increase productivity; newsletters and speeches; and attitude and opinion research which had not gone very far at that time and probably has not gone too far since. But this was finding out what the employee was thinking about, what the employee wanted, what the employee would like to do under situations of stress or dissatisfaction. As so often in the communication business, we had in Boulware a man of extremely strong character and great competence whose tireless energy really kept the G.E. employee relations program moving and driving forward. I was there at General Electric for five years. They were relatively successful in retaining control of the company and in helping to improve union relations. Ironically, one of the principle comments that our leader, Mr. Boulware used to make in his impassioned Southern style was that the union leaders ought to be in jail. It wasn't the union leaders, however, who went to jail. It was General Electric executives; some time later in the price-fixing case. Another example of failure of communication. The president of the company said, "I did not know that this was happening. I did not realize that this was going on. I had cautioned the managers again and again that this should not, could not, must not take place." But there was a communication failure here, somewhere. A very vital one. I wonder what it cost that company. Outside of the fines, it probably came to--in settlements--to $100 million dollars. And what about prestige? What about loss of confidence? The General Electric Company has built confidence over a 50 year period, with their initial "House of Magic," with their G. E. monogram, and I might add for your consideration that there was a book three inches thick that said, "This is what you need to know about the General Electric monogram. These are all the ways in which it can be displayed. These are all the sizes in which it can be produced. This is what you cannot do with it and what you must not do with it. The G.E. monogram must be preserved. It is our tie-line with the public--it is what the public has confidence in, it is what sells our goods in competition with other's goods." So they spent 50 years in building up the G.E. monogram; and it used to be said that you could see it burned into the forehead of every General Electric man. Some 50 years, yet in a period of a few months that image was seriously damaged, that investment was seriously impaired. The company was big enough, and great enough, and strong enough to rise above it and begin to come back and to take advantage of and be benefited by the public's wonderful sense of forgiveness and forgetfulness. I think in this case we have a prime example of a massive failure of internal communication.
Now how much this relates directly to some of your specific problems of content in graphic arts, may be a question in your mind. I would like to have you ask that question. I would like to have you explore it. Our subject is business communication; and this means a study of the business corporation. What is this titan? What is the anatomy of this tremendous creature, the business corporation? It is a deathless entity, it cannot die. It can be killed sometimes, but it is very hard to kill. What are the general outlines and what are the functions of this system, for this is what it is. It is a system; and, like all systems, it has demands on, requirements of, the people who work for it. Inside the corporate system is a sub-system--the communication system and this system has specific requirements and demands that say if you are going to work in the communication system, this is what you must be and this is what you must do.

Certainly you may not wish to go into a depth analysis of your students but as teachers and educators I think it is important to have an understanding of the business corporation and the business system and the communication system within that system. And we can look at failures of this system as being catastrophic not necessarily only for a company but for the employee; and not simply for all of the employees but specifically for the employee in the communication process, in the graphic arts; for the man who is dedicated to the proposition that communication is the nervous system of the corporate anatomy. We will probably discuss a few other failures of considerable significance as we go on. I think of this one simply in disucssing the experience at General Electric.

Boulware was an extremely interesting fellow with a lot of the teacher in him. You could learn a great deal from him. One thing we learned was that he was a tremendously hard worker. Unfortunately he used to boast about it and this made it a little bit hard to take. He would say, following Easter Sunday, "And where were you fellows yesterday?" Well, most of us were with our families at church or having dinner. But he would say, "I was on the 57th floor writing the General Electric Newsletter and as I looked down and saw the faces of the people, I thought of how hard I was working and how easy they were taking it during the day." Well, we went up to the 57th floor and found you can't see the faces of the people from there so we didn't know whether he was fabricating the Easter Sunday story or not. He was a great talker and had an endless flow of anecdotes and illustrations. This is undoubtedly one of the finest ways to teach if you have the experience and the background so that you can say, "Now let's take this man as an example of a communication process; let's take this incident or happening as an example."

To characterize Mr. Boulware--this tremendous worker, this tremendous salesman was always teaching the members of his staff. He didn't, as he said, wish to engage in a popularity contest. I must say he was not too popular among many of the staff but simply because he would nail us in his office and talk for interminable periods, sometimes for over two hours without a break. After a while, however, we came to realize that he was not just talking to exercise his ego; he was teaching us something about himself; teaching us about a program on which we were engaged; teaching us about techniques of communication as he saw them which were of course, largely the techniques of the sales manager who has a product or a service he wants to promote. Boulware was an incessant talker. At one time a Professor of Business Administration from Lehigh University (a very noted fellow who gave long lecture courses) came up to see us. He wanted to work for General Electric as a consultant and Boulware thought that perhaps he might be able to teach us and the rest of the staff and employees something of a worthwhile nature. I arranged for this gentlemen, Mr. Carruthers, to come to the office. He came up and had a few words with me and then we took the elevator and went to Mr. Boulware's office. I took him to the door and said, "Mr. Boulware - Professor Carruthers." Well, they looked at each other and gripped hands and Carruthers started to talk. For 45 minutes he talked and talked, with Boulware trying to interject a word or two. But he never made it. Finally, Boulware got up and said, "That is all for today, Professor Carruthers." I took

Professor Carruthers to the elevator and said goodbye to him. When I returned, Boulware said, "Vernon, we can't use that man." I said, "Why not?" Boulware said, "He talks too much." This is an example of over-communication on the part of somebody who is hoping to sell himself. He did not take the customer's--or buyer's--desires into consideration and he was interested only really in himself. This was not very good communication on the part of Professor Carruthers, of course, but Boulware was responsible in great measure for the same sort of a thing. He made an address once out in San Francisco--he was a very passionate talker--on employee and union communication. In the middle of his talk he began to liken the situation to something he had gone into at the time he was vice-president and sales manager of the Easy Washing Machine Company. He got very interested in his exposition of the problem and then, reverting to the sales manager pattern, began to list in great detail the advantages of the Easy Washing Machine as opposed to those of the competitors. Finally, he stopped--completely lost--and said, "Why, I have forgotten the point." And a fellow stood up in the audience and said, "Never mind, I'll take the washing machine." Another example of communication that had lost its sense of direction; saved, of course, by the humor of the audience. Boulware, however, was tremendously underrated by the company. G. E. engaged him to do a specific, very hard task and he did it well. He was perhaps not overrated either by his union opponents but they certainly feared him and lost no opportunity to ridicule in every way what he was doing and to knock down the sense of image and purpose that he was engaged in promoting. The union leaders could not afford to lose. His so-called "hard-nosed" attitude towards unionization and tough union negotiations came to be characterized by the unions as "Boulwareism." They moved it even farther--as the battle between unions and management intensified--to "international Boulwareism." Boulware came to be known as a controversial person and one who was, perhaps, more colorful and flamboyant than effective. However, I think those who worked with him over the years have had his stature grow in their memories: A very unusual man who accomplished a very difficult task, a great teacher. Farther along in our discussion of internal communication--and I should like to use General Electric as a case history in internal communications--I shall tell you more about what Boulware was doing and less about his personality.

I had been at General Electric about five years and then moved along to the General Dynamics Corporation which was then known as one of those hot young outfits that might possibly amount to something in the oncoming world of the electronics, aviation, missiles, submarines, and atomic energy. I will only refer briefly to General Dynamics at this time because I would like to use this company throughout the talk as an example of achievement in visual communication.

I should like to discuss the coming together of all the various skills and arts and crafts we are talking about into the two mainstreams--the twin-streams of creative technical skills and administrative competence. This, I feel, is a subject of importance to you because sooner or later a number of your people are going to move into the management group. Here, basic graphic arts skills will still remain an essential part of your background. But they must be supplemented by skill in the most intricate and difficult task of communication--that of learning to manage people. There isn't any task more difficult than this--or more worthwhile. Now many of your people in the arts and sciences--and particularly in communication--are happy and productive and fruitful in their particular creative skill and they ought to stay in that skill as long as it gratifies them. But others get moved into the position of being managers of men. This is the ultimate function of communication. At General Dynamics then, we had a whole spectrum of the communication arts and a terrifically condensed and exahusting thrust of exploration over a seven year period. My job there was to head up the entire communication activity of the company; responsible for policy determination, and program direction of all corporate and divisional advertising public relations, publications and graphics. As such, I got to know in very great detail many of the scores of basic problems which arise daily in the communication network, in the communication system. I shan't say any more about this except in that seven year period the company went from sales of $134 million dollars to sales of almost $2 billion dollars. What we had here was the program of the creation of a corporate entity out of potentially sound elements which had not yet come together into the system which later became known as General Dynamics. In an analysis of this company and its problems, we can perhaps best examine the purpose, the structure, and the function of the business organization and the operation of a communications system within it; and then within that system, the components--the human components who are the practitioners of the communication system. This way we shall probably be able to see very clearly the operations of corporate systems in largest scale. I would be happy to discuss other and smaller corporations because they do have a basically different system. I am thinking of a couple for whom I am now a consultant who may, because of their very small size, better illustrate a point that is to be made about communications. Now, following the seven years at General Dynamics Corporation, a decision made by me resulted in my leaving the corporation and becoming a consultant. I don't know that anyone can really say what the forces are that move one to make decisions through the years, but it seemed to be right after having completed a seven year period to move to another area in which what I had learned might be profitably employed without some of the restrictions and restraints that are imposed on an individual by a corporation. [I would be happy to discuss the inhibiting factors of corporate organization as well as liberating factors.] In the phase in which I am now, that of consultant, my work consists of problem-solving in areas of communication strategy; organization and management of the communication function; basic policy; articles and speeches; presentations and proposals. I have worked for CEIR--a computer services outfit in Washington which employs some very bright people --and have been for some time a consultant for the Boeing Company on proposals and presentations and more specifically with respect to the Supersonic Transport. I have been a consultant to consultants working for Allis-Chalmers. I don't know how much farther removed you can get, but I suppose this is probably the height of the profession. You don't even talk to the clients, you talk to the consulting psychiatrist or a management consultant or someone else in between. I have done a major massive study for a very large company, Combustion Engineering, I am engaged now in some problem-solving for one of the younger scientific operations--research and human factors people--

the Matrix Corporation. So much for the examination. I hope I have not lifted the horn too high; such has not been my intention at all. If you are the client --and you are--you are saying, "What has this fellow got? As long as he is hired on here for the week, how can we extract from him everything that he knows?" I am agreeable. We can, if we wish to do so, build a solution to certain problems that will arise in communications as we go along. I think that probably you may have some indications here of the complexity of the business organization, the business corporation, and the complexity of the communication function within it. However, I must say that we have really only hinted at the concept of the corporation itself as the major system or net in which the sub-system of communication is a minor but vital function. If your people, your students, are going to go into the business system, then you as their teachers must understand the system of communication within the business organization. You must understand that communication is a service function, supporting the other sections or functions of the business --management, operations, finance, marketing, and research.

1. The Corporation
    - (a) Identity, purpose, destination
      (1) form (2) function (3) growth
    - (b) Philosophy
      (1) character (2) strategy (3) tactics
    - (c) Environment
      (1) industry (2) governments (3) national economy (4) international economies
    - (d) Continuity (survival)
      (1) competition (2) technological change
      (3) economic change (4) political change
      (5) world balance of power
2. Communication
    - (a) General function
      (1) information net (2) steersman (coordination and control) (3) catalyst (4) the chief executive (organized executive group)
    - (b) External communication
        - (1) advertising
          (a) image (b) industrial (c) commercial
          (d) financial (e) special promotion
          (f) recruitment
        - (2) sales support
          (a) direct mail (b) capability brochures
          (c) catalogs (d) sales promotion
          (e) news letters (f) film, tapes, records, closed circuit TV (g) presentations and proposals
          (h) meetings, conventions, symposia (i) trade shows, exhibits, open houses, DEI's
        - (3) financial relations
            - (a) reports (b) advertising (c) PR
              (1) analysts (2) financial community
              (3) speeches (4) annual meetings
              (5) mailings
        - (4) public relations - management
            - (a) the chief executive
              (1) interviews (2) articles
              (3) speeches (4) panels, committees, institutions (5) honors and awards

        - (5) public relations - corporate
            (a) events - natural and contrived
            (b) financial (c) personnel (d) contracts
            (e) product achievements (f) research
            (g) facilities (h) administrative
            achievements (i) community (j) TV, radio, press
            (k) opinion leaders and trend setters

- (c) Internal communication
    - (1) formal system - employees
        (a) 3-way (b) all media (c) signs,
        symbols, graphics (d) surveys
    - (2) informal system - employees
        (a) grapevine (b) informal leaders
    - (3) identity system
        (a) graphics - all media (b) integrated
        design (c) nomenclature and symbol
        (d) style manual
    - (4) publications; information services
        (a) newspapers, magazines, newsletters,
        booklets, handbooks (b) mailing lists
        (c) graphics-editorial-photo-film-computer
        sections (d) tape, film, video, photo,
        microfilm, technical libraries (e) exhibits,
        open houses, rumor clinics (f) management
        schools (g) historical museums
- (d) Research (feedback)
    (1) customer (2) employee (3) share owners,
    financial community (4) human and electronic
    communication techniques
    (5) program evaluation
- (e) Review
- (f) Recycle

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The development of an effective communication program generally involves an eight-phase effort:

(1) Reconnaissance (2) Problem analysis and recommendations
(3) Strategy and tactics (4) Cost estimates (5) Action
(6) Feedback (7) Review (8) Recycle

## LECTURE 2

I think our first point in yesterday's meeting was that we would hope that this series of talks would not be in the form of lectures or in the form of dissertations on my part but would be a dialogue between the client-group and the consultant. One of the main points that we sought to make yesterday was the stipulation that intent and content are the major components in any communication program. The second subject pursued was a discussion of the resource-in-the-person of your consultant who is at your disposal, at your service to assist in solving problems that may have been generated during your weeks spent in the contemplation of the particular task you must perform when you return to your community; and how one as an individual might adopt this joint exploration to the development of a curriculum, the teaching of a communication system of which the graphic arts are related parts. I think we touched somewhat on the fact that a corporation is a system and the communication function is a sub-system within that system. Like any other system it makes demands, it has requirements that the participants in the system must meet. This is true of the highest level of managers and of the young man or young woman who comes into the production department or into the bullpen of the art department. We touched on the fact that--I advanced the opinion that--the communicator must be first of all essentially a thinker. And I conceive of the communicator not as someone who is proficient in one branch of the graphic arts but a generalist, a universalist if you will, who has a comprehension of the complete spectrum or range of the communications function and who is particularly skilled in one or more activities in that function. I indicated that I would not show any slides or any films and very few exhibits--on the assumption that among professional communicators such as we are an analysis of the communications process begins essentially in the mind of the communicator. This is true also of the specialist and the generalist or the universalist who may be produced by your efforts. Whatever comes out on paper, on the TV screen, or on the films originates in the camera of the mind. It must be thought out, it must be visualized, it must be conceived and very often in its entirety before it reaches the medium through which the expression of that idea is made. Everything then, I contend, begins in the mind and is implemented and supplemented by the hand and by the heart. If you ask me to define heart I would define it as emotion, as good feeling, compassionate feeling, the desire to be a constructive force rather than a destructive force. A number of years ago when Walter Chrysler was the head of the Chrysler Corporation and was making a tremendous impact on the automotive industry and on the financial world, I had the opportunity --because his son and I were friends-- to listen to him talk at night in informal groups gathered in his apartment on Park Avenue. Chrysler's "Park Avenue" apartment didn't mean a thing to him except as a convenience; it was near the office. He was a locomotive mechanic to begin with and a very good one. He headed up a locomotive works. Then he headed up the Buick Division of General Motors; and then he started out on his own with the Chrysler car. He was essentially a mechanic, he thought. Eventually it occurred to him, and to those associated with him, that he could manipulate a financial institution or a very large manufacturing organization in the same way he manipulated the parts of a locomotive; and that, whatever it was, he could put it together and take it apart and make it work and fix it when it went wrong. He developed also a tremendous merchandising sense--a public relations sense--unequaled at that time except possibly by his predecessor in General Motors, W. C. Durant. Another interesting thing about Chrysler was that even though he was then about 60 years old, all the young college fellows who came to the New York apartment could be stilled by this man when he walked into the room and said in a very gruff voice--"Hi fellows. What the hell are you up to?"--and then he would begin to talk. He would talk about merchandising automobiles; he would talk about selling; he would talk about advertising; he would talk about promotion. He was a fascinating person because he was talking from the heart and from the hand. He made a profound statement, at least profound to me; I have never forgotten it. He said, "I can never really understand anything except through my hands." Now this is the statement of the mechanic; it is the statement of the artisan; and it is also the statement of the artist. Here was a man able to build a huge corporation and a successful one that could survive many near catastrophies; a man able to erect an enormous building in Manhattan, able to pull off coups in the financial world; and to instill an entire organization with a unique, elan fighting spirit. He talked from the heart; and he talked about his hands as instruments for the acquisition of knowledge as well as for dispensing energies and skills. So, I think the communicator has got to be a "hand-and-heart-and-mind" man; and that from these simple things that are the basic essentials of the anatomy of the human being come the visualizations, the forms of created effort and expression which convey ideas and which manipulate situations and move masses of people to the actions we desire them to take. In our discussion yesterday we had some indication of the complexities of the communication process; skills required; the amount of work necessary to expend over many years, the struggles and the defeats that one must expect to encounter. We discussed the "F principle"--a simple thing but an example really of that fixing on a slogan or a phrase so helpful to young people in their early stages; a device or instrument they can carry that keeps them steady in times of crisis. When they have a problem they feel that they can't lick or are under a very stringent deadline, they can revert to a basic. Such simple, almost square, basics as the "F principle" or the chart "state the advantage; prove it; ask for the action." We discussed the impact of the teaching of large men in industry; Chrysler was one, Boulware for all his interesting eccentricities and foibles is another. And then we began to touch on the coming together of all of these skills into a continuum spectrum of communication capability. There were a number of questions at the end of the session that are extremely interesting to me. I would like, if you have no objection, to begin to field these questions out to you, to make my comments on them and, I hope, to get your participation in discussing them. Undoubtedly those who advance certain points of view are opposed by those who hold different points of view. I think it might be worthwhile if we would get a little interaction among this group of communicators, a little intracommunication to see if we can move these questions a little bit further, get a little more definitive statement of the problem and perhaps a solution to the problem. Out of these papers and questions I do have a specific suggestion as a consultant to you as a group and as individuals with respect to the problem of teaching of the curriculum and of getting the people who are under your guidance into productive and paying jobs either in industry or in the services or the communication business. I want to say that I am particularly indebted to one of you who has done a Saul Steinberg drawing of involuted curves going around, and around, and around and it comes out with a sort of a snake jaw effect here and it says, "ah, ah, ah." I think this is probably one of the most constructive criticisms that I have come across. I shall try to be responsive but it will be an effort. The trouble is that at Dartmouth we had an English professor who was really quite an extraordinary fellow and he became quite a cult there. His name was Robinson and he talked on English literature and the economic and social complex of Elizabethan times. Robinson would enter the lecture hall with a mass of papers and would stand at the lectern and when the bell rang he would start to talk and he ran continuously for a solid hour without a single pause or hesitation, rifling through his notes and at the end of his sixty minutes the bell would ring and he would finish--simultaneously. But his connectives were "ah--ah--ah." I was taught this way, unfortunately. So you see the terrible outcome of your teaching; it persists for a generation. But I feel better about it because I am among professionals and you won't adopt any of my troublesome mannerisms and I will have to ask you to bear with me. "Ahs are connectives to holding together the rhythm and the mass of the material and they give me an opportunity to think. Sometimes the "ah" is better than silence. Anyhow, I am going to take this back home or perhaps I will ask one of the graphic arts people here to blow this up about 8 times the regular size and you can put it into one of your courses. An excellent piece of graphic realism. It has also an admirable reticence about it; it is polite. It is what will happen to you all when you get your video recorders and see yourselves on TV. You'll take your video tape and play it back in the sanctity of your home and your wife will say, "That doesn't sound like you. It doesn't even look like you." But the drawing is an adroit piece of criticism and I am grateful for it. At one time, Hopkins who was Chairman of the Board, the Founder, and the President, and the total inspiration of the General Dynamics Corporation was making a speech at the recently acquired Stromberg-Carlson division in Rochester. The Rochester people were very community minded and since the big corporation was coming in to take over their most prominent industry, they gave them a great deal of play on the TV. So the evening after he had made his speech and had his news conference we were all asked to sit around at a meeting of Stromberg-Carlson officials for a replay of the television interview and of Hopkins speech. As we were sitting there with Hopkins on TV talking about the General Dynamics Corporation and saying --"Ah, our purpose here in--ah--Rochester--ah--is--ah--to--." The real live Hopkins turned around to me and said, "Vernon, get those 'ahs' out of there." I was not able to do it at that moment. I did finally, through the use of tape recordings, help him get them out of his speeches; and perhaps took them on myself.

I have a question here that was asked yesterday:-Should students be taught only general basic skills in school and be left to maturity for the gaining of technique? Or should the high school give the technique and hope the student will use it well. Is specialization in our schools a necessary thing or even a useful solution to the student's problem? Answer: I don't think I am qualified to answer it. Is there anyone in the group of communicators who wants to make an observation? From my point of view, anyone who doesn't have a skill in a modern and industrial society is actually lost. He has got to have a skill. He has to have it because there is in the communication field a great emphasis on specialization and the student has to come out of the educational institution, high school, or junior college with something that he can sell; with something that he can fall back on; something that is a survival kit for his progress through life and through his career. I don't think that he can breach the wall of the industrial organization unless he has some merchandizable skill that makes someone say, "I want this." Gaining of technique--technique is really something that is a lifetime process. There are stages of technique and you are always learning technique, you are always learning something new. Of course, in the modern technological society there is always something new coming along and you have to keep catching up with it and working at it. I don't know that I can make any more than a general observation unless you want to pursue it a little bit further. I would cram everything into them you could cram even though that is very hard on the teacher as well as on the student. Having been some thirty years in this jungle I don't trust these people very much. If you send young people into these organizations, they ought to have every skill and every instrument and every tool, every weapon that they can have; and I don't mean this in a punitive or disagreeable sense. I mean, this is like sending kids into the great swamp without the survival kit; you have got to give them everything you possibly can. The pace is intensifying; the competition is becoming greater; and smarter and smarter people are doing more clever things, under greater pressures with more people hounding them for results. The fellow who is not equipped, who doesn't have the skills, who doesn't have something to revert to when the panic button is pushed, is going to be in trouble--to put it mildly. QUESTION: If there are hard feelings between labor and management, is communication difficult between them? ANSWER: This is almost like saying--when your wife goes out and slams the door is communication difficult between you? Indeed it is. And not just from the standpoint of the barrier of the closed and perhaps locked door, but simply because of the barriers of the emotional state. In the public sense when this occurs between union and management or labor and management it is almost impossible to communicate, as you will note in the current airlines strike. However, sometimes a good many of these feelings are on the surface and they don't represent the true state of affairs. This may be true of the marital situation also in which blowing off steam or making a demonstration or a long held point may be an important thing to do. If the real issue is the question of the power of the union leader versus the power of the management then we have a stalemate in which there isn't any communication. Most union leaders however, are very shrewd businessmen and they are dealing with shrewd businessmen on the other side. I would say that communication does go on and it goes on in phone calls, it goes on in visits that are not publicized--after all the press--although it tries to be a part of these things and be knowledgeable and to be in on them and to beat each other on releases and items of interest--the press is not privy to what actually goes on. And I would guess that in many of these cases there is interflow of communication between the union people and the management people that gives them a very clear idea of just where everybody stands. The management may go to the union and say, "Well, what would you think if we, on Tuesday or Wednesday, gave you the following package." And the union fellow says, "Well, that is just not good enough for me. I've got to go to my boys and give them something they are really going to appreciate. What about moving this area up a little bit or increasing these benefits or giving us two cents more an hour?" And the management fellow says, "Well, I will go back and talk to the committee about it and then I will be in touch with you by phone tonight--I have your home phone number." And the other fellow says, "Yes, and I have yours." So the communication may be difficult if an emotional state exists or it may be difficult because there are power struggles going on, or it may be difficult because there is an unconsciously determined time scheme for these things. This is not given out to the press but I would say that communication is going on via the grapevine positively and via the informal conversation pretty certainly. The purpose of the news media of course, is to build circulation and I think we can look at some of these things which are facts of competition or competitive life without bitterness and without really being adversely critical. We simply note that the function of the news media is to build circulation for its product, news. If there isn't any news, I am sure the tendency to generate news is a natural one that we must evaluate and take into consideration. So furor, heat, excitement are often generated by the news media or they take something pretty small and fan it up to a flame that is bigger than actually exists. Reverting again to your question--the negotiators on both sides are very professional people and there may be grievances that have to be settled but these people are not just meeting each other once a year as you probably very well know. There is a continuous interflow of communication between union and management, union leaders and management leaders during every day of every year and nothing is really a great surprise to anybody. Now I note that in the Michigan public service employee's strike and threatened strike that there seems to have been a stalemate on a couple of issues and the state mediation board has come in and has affected a solution. Now the inviting in of the impartial referee of course, is a way of soothing feelings and saving face and of opening up the channels of communication and making them work. This is well-known to the union people, well-known to management people and when they get ready to do it then this means will be undertaken, I believe. The whole subject of union-management negotiations and labor relations is an exceedingly intricate and tricky and is a really top level, highly professional specialized branch of the communications business and we could really spend the next five days at it and understand very little about it unless we had visitations from the union people and from the management people--preferably on different days--to tell you what the grind of the daily negotiations may be. QUESTION: Do you think many of the strikes today are a breakdown in communications through an unwillingness to communicate? ANSWER: I think we have covered pretty well the idea of the communication being there and the apparent unwillingness to communicate may be a purposeful thing and not an absolute natural block like a landslide over a river. The question is basically the intent of both sides; and what will this sort of indian wrestling produce and who will graciously concede for the time being. There is communication going on; if they are unwilling to communicate, it is purposeful. QUESTION: Do you feel we are in a period of communication where the people and their feelings are not being taken as seriously as they should be? ANSWER: I wasn't quite clear as to what that meant. Would this mean frivolity in advertising, or wise-cracking ads; or are we out of the communications business and into the general public? I can think that a good many people might feel that their feelings were not taken seriously when we see on television so many doves flying into kitchens and white tornadoes whipping through the pantry or women portrayed on the television screen as screaming, loud-voiced, and irritating and the men as silly fellows who don't have very much sense and who have to be told how to answer when someone says "good morning." I don't really know. QUESTION: Can you account for the generally poor quality of American advertising art? ANSWER: If the advertising art referred to is in television, yes I think it is poor and why it is poor or why they tolerate it or why they think it is worthwhile I really can't say. This is a question that is discussed a great deal among art directors and television people and why it is necessary to be crude or cornball or simply sloppy or ugly in this sort of thing, I don't honestly know. I think the publications are far in advance of television with respect to the policy of the advertising art. But there is a certain school of treat'em rough, sock'em, give them the "schlock" treatment because that is what sells, that is what pays off. That may be purposeful promotion of a certain cliche or group in the advertising and promotion business. I think--well, art directors everywhere are extremely conscious of this and are tremendously interested in developing new standards and higher standards for art. (In answer to comment from audience) --I think that the people who are in the business tend to divide into the two schools and say we have case histories that prove that we moved X units of merchandise with rock'em and sock'em and the other fellow might conversely say, "Well, we can prove that you do it with the high level, sophistication type of thing." Let's take a modern merchandising success like Volkswagen. I think that the standards of the layout, standards of art are very high. The VW is a particularly ugly little beast that starts out with a great disadvantage; but they have adroitly capitalized on the apparent disadvantage and made it lovable, like a dachshund. It is wagging its tail all the time and ingratiating itself into your affections. This is very good strategy from their point of view. The art direction; the choice of the type; the use of the white space; the positioning of the illustration and copy blocks; to say nothing of the easy informal and clever but not too clever copy is all part of the very high level of the total advertising design concept and the merchandising program.

One also ought to raise the question of how stupid, really, are a lot of people. There are a lot of very willful people in industry and in business and there are a lot of people who are slightly dumb on the esthetic side. There are a lot of people who find relief in being rough and aggressive and crowding the customer. I think this tends to come down to what type of person are you. What type of corporation are you? What type of advertising agency are you? Are you a rough, tough, sock'em guy who likes the brass knuckles treatment and wants to rush in and hit people on the head and say, "Now, don't you want the product?" Or are you more adroit and prefer to do your merchandising on a more sophisticated level? Does this give you some satisfaction?

Do you feel you are approaching people on a higher plane and getting your sales too? I think that it is perfectly obvious that when you see a television program that takes some thought on your part on international relations or some of the educational programs on art or literature or drama or some of the documentaries that CBS and NBC put out that you are at a very high level comparatively, and it takes some attention to follow what is going on and all of a sudden in the commercial break, when you go out to get the extra cup of coffee or the beer or attend to other things, all of a sudden you drop from an intelligent fairly high level discussion to something that is at the "grunt" stage. One doesn't suddenly, sitting in the chair, descend from the height of an ordinary, intelligent American citizen to a sort of a Neanderthal fellow in a bear skin simply interested in his appetite, rubbing his stomach or alleviating the pain in his head or putting something into a washing machine and watching it foam. Washing machine commercials, detergent commercials are really, I think, pretty nearly the low in this sort of silly nonsense. (In answer to comment from audience) The detergent business is a rapid turn-over operation in which new brands are coming out all the time and everybody is scrambling and fighting hard for the market and the client says, "I got to have something new today, something new today--why don't you fellows think up something great?" They go back and they hammer their heads and they do the unstructured conference and they beat against the wall and some fellow says, "I've got it, I've got it," and they all say, "What is it?" and he says something stupid and they say, "Yeah! That's it, boy! You've got it." So they go back to the client and he has just gotten a real severe burn from the man in the next office up and he says, "What have you fellows got for me?" And they say, "Chief, we really got it. Give it to him, Jack, give it to him." And Jack goes through the routine of a ten-foot-high washer [whatever it is, it is ridiculous] and another fellow plays the part of the screaming female and the client says, "Well, it's pretty awful but we got to go in right now." So he goes into the boss and he says, "Gee, boss. We got it, we really got it!" And the next thing you know it's on the air and you've got it. There is a real mad scramble for these things and the Proctor and Gambles and the other people really have a frightful merchandising problem; they have to try to keep things souped up and it gets to be a good deal like some aspects of show business when the audience isn't responding and is getting up and walking out or is looking the other way--the voice gets higher and the tone gets shriller and the antics become more outrageous. In a night club, the humor becomes bluer. This is usually the sign of a fellow who is in trouble. And a great many of them are, from a merchandising point of view. On the other hand, there are some people who are smart enough to take advantage of difficult situations--who will always play the opposite field and if the tension is very tight and the screaming is very high and the nonsense is very outrageous, then they will go in an do something smooth and quiet and sophisticated. If the whole group should come down to a smooth, quiet, sophisticated approach, these fellows would go into the screaming level again. These are the merchandisers who use black and white when everyone else is using color and use color when everyone is using black and white. Pretty complicated really from a merchandising standpoint. But on the other hand I think there are more and more people who are pulling the plug on the TV and there isn't any reason why you can't. I don't understand that from an educational standpoint. The question: What shall we do about television? You do the same thing that you do with a computer that has been programmed incorrectly, you pull the plug; kick the switch; shut it off. (Answer to comment) - It does in this particular segment of the business where the product difference is very minimal and where the housewife is very fickle and slips back and forth and says--I guess I will try Fab today; Dash tomorrow; I guess I will try something else the next day--type of thing. Actually, from a chemical analysis standpoint or from the whiter wash, unbiased report, I am sure that there wouldn't be too much, but the consumers themselves like to play this game. I think that perhaps the customers have a feeling that while there might be some difference, it doesn't do any harm to try and the box is prettier and there is four cents off this week instead of three cents off and what difference does it make anyhow? This is a good point, the marketing difference is very small and the effort to sustain the brand identification--product identification--and to move and manipulate, orient people toward this particular type of color of box and this particular product name or manufacturer is the problem. If they lose their grip in the market then they have had it; getting back again is an extremely perilous business as long as I can remember. It is the "12 year old level." The "12 year old mind" concept of the consumer, I think, is the bunk and I don't know why it is still promoted. It is certainly one of the oldest and most out-moded phrases. I don't see how companies in the communications business--CBS and NBC--can stomach this sort of "corny" thinking. They must be out of their minds to be putting on programs that require some intelligence on the part of the viewer and then all of a sudden say in the commercial, "you go back to the 12 year old mind because the guy can't understand your product unless you do." The viewer-consumer can read the Wall Street Journal or he can read and understand the editorials in the New York Daily News--which is, after all, a picture newspaper but yet has some of the smartest, sharpest, most intelligent editorials in the business. Anybody who can read the Daily News as a newspaper is not dealing in any really too complex symbology or rational or logical thought, but the Daily News doesn't cut its editorials to nonsense and foolishness simply because it feels that the people who read it have a high school education or less. The publishers of the News are sensitive and responsive to what their circulation wants. There isn't really any rational explanation for the "12 year old mind" method of selling or the 12th grade level. I don't think there is any evidence to indicate this, I think it is a cliche and silly.

(In answer to comment) - The cultivation of the youth and sub-youth market by the advertiser is certainly a fact. I don't know what they think they are selling. Of course, there is a theory that this is, in some instances, a reverse pressure and the children will twist the arms of the adults to buy this product or that product but I just wonder if these people are spending millions of dollars to talk to a non-buying audience. There are some stomach-turning doubts in the advertising business itself in this respect.

(In answer to comment) - The child market, the pressure of the little fellow who says, "Well daddy, I will pick the cereal and you don't really care because they are all good," does interest father and they do approach him, they do seek to solicit his or her attention. The same type of thinking apparently slops over into the adult side and I think perhaps your wife feels it doesn't matter--there is a low-level child market approach that is important and useful and there is an adult market that one would hope, simply from the standpoint of elimination of boredom, that we would get over. I know, of course, and you do too, that the children play commercial games and the commercial becomes a part of their language and they engage each other and amuse each other by repeating and singing the songs and I believe the latest gimmick is to transpose the personalities of Susan Spotless and Smokey Bear. You are probably aware of Smokey Bear who is worried about forest fires and whatnot and Susan Spotless is a little-girl voice which says, "Don't you adults know that every litter bit hurts; don't throw your trash on the sidewalk; put it in the wastebasket." And the kids get great fun out of having Smokey Bear's voice do the Susan Spotless routine. I think the use of the children to be our moral guides and our physical guardians is a very interesting development in our economy. It tends to support the worship of youth which is beginning to have some disastrous consequences, I think.

QUESTION: What are your specific suggestions that you give a concern such as Boeing? ANSWER: This, of course, can be answered by another question--What areas? There are hundreds of areas in which Boeing might be given suggestions. Whether they will take them is another thing. My present work is to seek, to suggest to them advanced ideas in visual communication for presentation on the SST proposal that is coming up in September. They will have about 150 evaluators from the airlines and the government comes in and spends a week examining every facet of the business and every curve on the airplane. I don't think I can comment any further on that because it is work in progress and of confidential nature. But one can't really make--I mean you could say there could be hundreds of suggestions in dozens of areas. We will get into that probably in some of our discussion on corporation and communications function.

QUESTION: What do you think the obligations of industry should be towards public welfare, toward the effect of use of its product? Generally referring to the big hassle between congress and the auto industry. Was there a lack of communication? Who do you feel should be responsible for determining what is the proper intent to be communicated? If the practitioners of visual communications are simply the translators and the interpreters and processors of the message to be transmitted, why should they have any obligation with respect to the intent or contents of the program? If one does have an obligation in this respect, what does this do to one's job? Should one feel strongly enough about it so that one would commit himself and thus lose his job? ANSWER: These are general questions that refer to one's attitude as a citizen, as a human being, as a person with a conscience, or as a person with stance. They, of course, are alongside of, and in some sense, separate from the development and technique and skill which is an important part of the process of earning a living and of continuing to earn a living. Yet, on the other hand, if persons in this business are not concerned with intent and content, eventually there will be a degrading or downgrading of the whole communication process and one will find that there will be a public apathy or a public revolt or a change or a movement that means that the job will diminish and constrict and the function itself will become a less desireable one from the standpoint of intelligent, creative people. This is a decision, of course, that everyone has to make as a separate man and as a separate woman and it would be true in whatever job you are engaged or career you have picked. If you don't really know very much about the business corporation and how it works, then you are at a considerable disadvantage in assessing the market for your future students and the type of person you want to train up to occupy a place in industry. Not all of your people will be going into industry of course, but ours is an industrial economy, ours is a market economy; it is in business; its chief characteristic is not philosophy or music but actually enterprise and the trading of goods. Therefore, I think it is well to make a study, a deep study of the industrial corporation and to find out what it is and what makes it tick and for what purpose it is organized. It might be helpful if we talked about one particular company as an example of the sort of institution with which we are to be engaged rather than to generalize. So I had thought that we might talk a bit about General Dynamics Corporation and to indicate what the communication function was, and to a great extent still is, and what are the aspects of it that are of interest to people devoted to graphic arts.

A number of years ago, Chester Barnard, who was president of New Jersey Bell Telephone Company, wrote a book on organization and management and also one on the functions of the executive. There have been, of course, scores of books, perhaps hundreds on management and management processes written since then, many dealing with aspects of communication. However, I haven't seen any that more concisely stated the importance of the communication function than Barnard's statement:- "In an exhaustive theory of organization, communication would occupy a central place because the structure, extensiveness, and scope of organization are almost entirely dependent upon and determined by communication techniques." And the most important part of the communication network which holds the organization together is the chief executive. The chief executive is the chief communicator in the business and by chief executive I don't necessarily mean the one single man--in the person of a man--but I mean that one single man and his executive staff, what Barnard refers to as "the executive group." This group composed of the president and his chief advisors, his executive vice-presidents in areas of engineering, marketing, research, operations, and sometimes communication. These are the chief communicators of policy, purpose, direction, and continuity for the division, subsidiaries, and the affiliated communities; and these are what the probability people would call the complex probabilistic systems which comprise a total communication net. In this sense, the corporation itself is an information network:- A communication system that is also an "event" in a much larger economic industrial social network which is, in turn an "event" in the still larger and more complicated communication system--the United States of America and, ultimately, world market and political systems. The identity and the continuity of the corporation as a personality, of course, is a prime requirement for its survival. It must identify itself. it must be conscious itself, of its own identity and its own personality. The corporation has definite purpose; it has a specific destination; it has a reason for being. Of course, many corporations simply grow up by chance and are later modified by practitioners of the management art and adjusted to fit more precisely into the marketing complex of which they are a part; or those services or products or complexes in which they wish to make a profit. The prime purpose of the corporate entity is--the ordinary corporate entity--is to make money. To make a profit--this, of course, in contrast to non-profit organizations which have grown up to some extent in servicing large areas of the government --but in general the mainspring of the American market system is the ability of the business corporation to make money; to make a profit; to survive. This is above all; this is the first consideration. If you don't survive--if you aren't making money you aren't going to survive--then you fade out and become a non-entity; there are no longer any jobs; there is no longer any purpose or direction; there is no longer any company. So the purpose of the corporation is first to exist, and then to survive, and then to grow. Every corporation has a philosophy--has a character--and out of this philosophy and character develops the strategy and tactics of operation. These are very different, in many respects. The large soap companies and manufacturers which we were talking about a few minutes ago are companies devoted entirely to the very rapid turnover of many different items. This means that since they make small margins of profit they must turn that material over and over again to accumulate the volume they need. This calls for a different type of merchandising, a different purpose than that of a corporation such as General Dynamics or such a company, for instance, as Allis-Chalmers. Not every company understands what its purposes are. It is the function of the communicator, in his role as advisor or as staff man or staff department to help the corporation define what that purpose is because out of this purpose springs a vast variety of exercises and "events" contributing to the two primary purposes of the company to survive--as an identity. We can take General Dynamics as a special case of this sort of thing and then perhaps in your further studies you can take other corporations and see what you can find out about them and analyze them. There are a number of books on the market--in paperback--that deal with the corporation. I understand that you have been asked to read, or did read, MY YEARS WITH GENERAL MOTORS--the Alfred Sloan book. This is a good book; a good account of our largest industrial organization and how it has grown. There are a number of other books--one of them is of somewhat dubious nature but of interest, a book called CORPORATIONS IN CRISIS, written by an editor of Fortune Magazine. A large section of that book is devoted to General Dynamics and this account I would say, is interesting--and it is fiction. One of the group was questioning a while ago in the break, --just how much of this sort of dissemination by business publications and by others is actual fact. Well, I think in almost everything concerned with the communication industry there are very few bare facts of the sort observed by the physicist or by the chemist. There are approximations to facts; there are distortions of facts; there are mirror images of facts and there are cloudy-glass facts; and all of it gives you only the flickering images on the walls of the cave in Plato's famous analogy. You get an approximation, you know something is there and as communicators you are going to have to probe and find out more definitely what does go on. You have to piece stuff together and say --"Well, this doesn't fit with that; this does fit with that." And painfully and carefully you build your understanding of a corporation. I don't think that you are going to get too much out of books. I believe you are going to have to pursue your own studies and analyses of the corporations and get your feedback from your own students and graduates who have moved out into the field and from your educational institutions who tend to gather facts rather than fancies and fiction. But anyhow, let's say that a corporation has got to have a philosophy and has got to have character and must--out of these--develop strategy and tactics. The purpose of the General Dynamics Corporation was not stated when the corporation was being formed. The corporation began really as the Electric Boat Company. Electric Boat made submarines and during the 1930-32 period when the "merchants of death" publications were coming out and anyone engaged in armament was a monster, Electric Boat was depicted as perhaps the greatest monster on this side of the Atlantic and a company engaged in various activities and deals with exotic individuals such as Sir Basil Zaharoff and his international munitions cartel. This was not a particularly good image for a company to have--to begin with--so Electric Boat, after the first war, went into a period of decline. This phenomenon is known as the "feast and famine" phasing of the defense industry. When there is international peril and is a war about to come, then for defense suppliers it is feast. Orders and contracts abound. Money is made rapidly; the organization expands and 12,000 people are employed in the submarine yard where only 3,000 might normally be there. After the war, in the famine stage, when the peril was past--Electric Boat suffered a decline, went into the "bath tub" and was compelled to manufacture linotype machines and bobby pins in order to survive. There were no submarines being bought even by the, perhaps, mythical international munitions cartel. At this time, a man came into the organization, name of Hopkins; a lawyer, graduated from Harvard; been a member of the law firm of Cravath, Surin and de Gerzdorff and was independently wealthy from oil investments and family oil interests. He was first legal counsel to the organization, then at insistence executive vice president and then--possibly to the regret of some of the directors--he was made president. This exposition is important in the analysis of a corporation and important to understand with respect to the people about whom we are going to be talking. Hopkins' first move was to take the resources of Electric Boat and to purchase Canadair, a Canadian aircraft manufacturing company which wasn't manufacturing any aircraft. They did, however, have a large store of spare parts, engines, wing sections, wheels--that sort of thing. The board of directors of Electric Boat thought Hopkins was out of his mind and made a vigorous protest that this was not the business in which the company was engaged in and could not be legitimately entered upon. Hopkins had considerable muscle, however, and he decided that they were going to do it and they did do it and they bought the Canadair facility. Almost instantly there were international reprecussions and rumors of wars began to break out. All of a sudden everybody wanted those spare parts that Canadair had bought and stored in its warehouses. At this time there was a large movement out of the board of directors and other people came in and Hopkins was publicized in the business papers under the headline--"Jonah Swallows the Whale." Canadair became part of Electric Boat, became a subsidiary. At the time that it was my privilege to enter the picture Hopkins was negotiating with Floyd Odlum, the financier who held the controlling interest in Convair--Consolidated Vultee Aircraft Corporation--which had, as you know, made flying boats and other military aircraft during the war. Also, Convair was the prime contractor for development of the Atlas intercontinental ballistic missile. There were protracted negotiations and deals and finally Hopkins acquired for his company the Convair San Diego aircraft manufacturing facility. Just prior to the Convair merger, Hopkins decided to change the change the name of the company because the purposes of the company had changed. There was no longer just Electric Boat, just a submarine manufacturing facility with a Canadian subsidiary. Hopkins was about to be in the aircraft and missile business but it was also in his mind that the new face of nuclear energy presented new opportunities for corporate growth. Again we have the visualizer. You see--I want to talk about Hopkins because he is a communicator--a man who with thousands of other responsibilities and duties to perform was largely a communicator, largely a visualizer.

Now the people you are dealing with--your students--are children and they are going to be children for some time. These are young people and they are going to be foolish young people and they are going to do foolish things but they are going to grow. I keep remembering Billy Conn's statement when he tried to slug it out with Joe Louis and didn't make it and afterwards they said, "Well, what the deuce did you do that for? You were ahead on points." And Conn said, "What's the use of being Irish if you can't be dumb?" And this charming comment is--the paraphrase is really for our young people. "What's the use of being young if you can't be foolish?" There is a certain foolish grace in these people and, of course, they must be foolish for a while; but they're going to have to sober up sooner or later and it's well to think about what sort of models and standards you put up for them. If you would study the communication process in business--now, you may not want to really do this, I don't know--but some might well feel that this is the area of the greatest opportunity for your people.

QUESTION: Because of the crying down attitude of business on graphics and arts people, is it really worthwhile to tell these people to go into business?
ANSWER: I would say that you certainly should and you must, and this is a profound obligation because the greatest opportunities for graphics artists and designers--people who have creative instincts, who have creative talents--is in the American economy and in American industry. As you can well see for yourself, opportunities are not only there now but are proliferating, becoming more important, becoming bigger. With the advent of new and exciting technological achievements there simply is no limit to what the creative person, the designer, the graphic arts man or woman can do. I think you have an obligation to tell this to your people and to paint this picture of what is coming and what these tremendous job opportunities are. I must say that there has not been any real steady and hard promotion by leaders, by designers, or by artists. During the whole seven years that I was vice president in charge of all communication activities for General Dynamics Corporation--including all the divisions and subsidiaries--there did not come to my attention--and I had a pretty sensitive feel for it through our advertising directors and our managers--there did not come to my attention the case of one single designer making application for a job at General Dynamics headquarters. We had a top designer, Eric Nitsche, a Swiss. [Some of his work is over there on the wall and in a minute or two I'll tell you why it's there.] I don't know whether Nitsche's eminence in the design field or his obvious capability in good advertising design scared people off or not. It may have. Perhaps they were simply being very ethical, very polite, and very unbusinesslike. I don't know whether this is true but if designers and graphics people do want jobs they'll have to go after them. They will have to promote themselves and be

promoted by their monitors and their sponsors and their mentors. You can't let these people go out there alone without some promotion. You can't let them butt into these organizations unless they know what the facts are and what the realities may be. Getting back to Hopkins, here you have a man of gigantic stature, the communicator par excellence; a man who had a concept of a corporation and knew how to promote it and knew how to hire the talent to make that promotion. There aren't very many of these fellows around and some of them slip over to the other side where they become superlative artists in conning the public. These people under current government restrictions and also the restrictions of the society no longer have the freedom that they used to have to gull people. Because of increased sophistication, education, and knowledge, intelligence, and shrewdness they can't get away with it as they used to do except when dealing in vegetable oils. You may be aware of this big scandal of a couple of years ago on the East coast where a fellow promoted nothing into about five hundred million dollars and the chief gulls in the case were some of the most knowledgeable financial people in Wall Street. This was interesting because it was so in the nineteenth century; it had been so many times before. Of course, he didn't get away with it. He is serving a limited jail sentence. I think the embarrassment to the financial community was the greater injury.

However, getting back to Hopkins, like this man _you_ have diverse problems, things to pull together. You have diverse talents and facilities to pull together into an integrated whole. This I gather is what you are here for this summer and what you must do when you get back into your home localities. You must take these component parts and build them into a system. Here is an analogy for you: Hopkins did the same. He took over Electric Boat--a little defense outfit that didn't matter a damn to the financial community or the world economy and moving from that base, he took over another diverse part--the Canadair manufacturing facility and everybody said, "Why bother about Canadians? They are a very independent people and we don't have any business to do with them." Of course, I realize Canada is only an hour away and perhaps it is pertinent to talk about it. Canadians _are_ very independent people; they are very smart people; very able people. The business people, the organization men in the financial community said of Hopkins, "What is this fellow from California doing here? He's a lawyer. I mean, he shouldn't be doing this sort of thing. Why does he suddenly want to acquire Convair, a huge aircraft facility. With 25,000 people in San Diego alone and 20,000 more in Fort Worth, what is _he_ doing here?" Well, what he was doing there was putting together a system. He had a concept. He had an idea, he had a pattern in the mind and this pattern was composed of defense, business, new forms of energy, and possibly some consumer items. What for? First, to make a profit. Well, I guess not first. I guess with Hopkins, profit was number two. Number one was to put together a system in the same sense that an architect puts together a building or an artist paints a painting. He doesn't really know; he wants to paint a painting --he wants to _do_--he wants to sculpt; he wants to create something with his hands--like Chrysler. Chrysler put together a company. Chrysler was a communicator; he was a design man. He had a concept of the corporation in the mind and it came out through the heart and the hand. And that became an extension, an extension into staff, an extension into graphics people, an extension into all sorts of persons and groups that could serve this idea and the formation and use of it.

The Chrysler Corporation was an artistic concept, it wasn't simply the promotion of a businessman saying, "I want to make a buck." This is the work of a man who says, "I want to design something that is a functioning mechanism for the achievement of a certain purpose." Chrysler's purpose was to perform prodigies of the needed work. His feeling was that the defense facilities in the country were inadequate, had been poorly administered and poorly developed and that there was a great big fat hole in the USA head that needed to be filled. He thought he could do it by a combination of aircraft, submarines, and missiles. Regardless of what the problem may be as far as an individual conviction is concerned--war or not war, military intervention or no military intervention--it seems to be a fact of life that modern society must have capable methods of defense; and offense, also, when needed. This was the Hopkins concept. Now along with that, the concept of defense, there was also a particular fascination for him in nuclear energy. This was in 1952-53 when there was not anything really constructive being done with atomic energy; when the echo of the bomb and the radioactive dust from it had hardly settled over the world. People in the AEC and under the President were fast beginning to develop the concept of the peaceful uses of atomic energy. This interested Hopkins intensely. Nuclear energy for peaceful purposes as well as for submarine propulsion became a part of the Hopkins scheme, part of the net, part of the design. He added this component to the design and he brought into the company, Gordon Dean who had been the Chairman of the United States Atomic Energy Commission. Hopkins himself participated in the early conferences with Senator McMahon, Lewis Strauss, and others in the development along with Bernard Barauch of the concept of the peaceful uses of atomic energy. But along with the peaceful uses of atomic energy there was the necessity, the compulsion to develop an atomic powered submarine. This was an absolutely impossible task technically and under the direction of an absolutely impossible person--Admiral Hyman G. Rickover. Rickover was impossible--and I say this with all respect--impossible because he had an impossible job. He was determined to do it and everyone thought he couldn't do it. He was besieged from all sides; sabotaged; knocked down, but never dragged out. When he told Hopkins, "You want to make an atomic submarine for the defense of the country. Do you think you can do it? We know you can make the submarine hull, but you don't know anything about atomic energy. Westinhouse does. What we need to do is to bring these two things together and to see if we can't develop a facility for the defense of the nation and, perhaps, for the future peaceful use of atomic energy as a power unit in the electrical utility system in the United States shipping and possibly, in the future, in aircraft. The aircraft problems, technically, were absolutely beyond fantasy and still are and I doubt if there will be anything there for a good long time. What happened was that Rickover and Electric Boat began to do the impossible. They began to construct the Nautilus submarine. The poster you see there is an "Atoms for Peace" poster and the submarine coming out of the Nautilus shell symbolizes the development of its nuclear power.

Now, earlier we had Hopkins beginning his task of merging these things together; and we had at that time headlines in the business publications saying about the Dynamics-Convair merger--"Jonah Swallows his Second Whale." The second whale was very indigestible. Dynamics was a little company with a big mouth; but not much of a stomach. The whale didn't want to be swallowed. Of course, financing being what it is, when you get seventeen percent of the stock you have control. So Mr. Odlum sold seventeen percent of the stock to Hopkins and General Dynamics took charge. The great vision in his mind of the integrated system, the defense complex with "atomic energy for peaceful uses" coming up, Hopkins went out to San Diego to talk with the heads of the new acquisition. He was not cordially received by the Convair San Diego group. [I am now talking to you simply as professionals. There is no condemnation of person in these comments.] One expects these things. They become part of the job. These recalcitrant organizations which are brought, sometimes dragged by the heels, into a master complex or holding system don't want to be absorbed. They have had their own life, they have been independent corporations for a long time. Of course, in the case of Convair, the corporation had been on the block for a number of years; it could have been sold to anybody. But Hopkins was the one that bought it and Hopkins was "that man from New York." This sort of thing, which is part of the normal, unpleasant characteristics of human beings, became accentuated by the feeling by the Convair division that it had been drawn into a complex that was not going to permit it to operate at full scope and with capability. "Who was this little outfit from New York that by some financial wizardry had gotten control of the giant of the West Coast? What did these New York financial people really know about merchandising? What did they know about the aircraft business? Could our jobs survive? What is our future going to be if we are delivered into the hands of these persons?" A condition such as this transcends personalities. To relieve it then becomes a problem of internal communication. This is, perhaps, a classic example of what happens again and again and it happens in more and more industry because of the continual merging and affiliation of companies with each other, some allied and some extremely diverse. In the case of the diversity, it is even a more difficult internal communication problem than it could ever possibly be at GD because Hopkins had the scheme, the systems, the concept, the pattern, the plan in his mind. They didn't know that, of course, but what we had here was a very powerful organization full of extremely talented people, particularly talented people in the communications field. They immediately, as professionals, asked, "Who are these fellows in the outfit from New York? What do they know about it? We are about to get out an annual report, how can they do anything except gum it up, make a mess of it. We are not going to cooperate. We are going to continue to work as an independent division and let them worry about the integration." Well, looking at it remotely as we are now with the 10 or 15 year differential, the hard edges of this thing become softened and you don't get the feel, the agonizing feel of what it is like not to have a communications system. It is like being cut off from your own family. I suppose many of you can think of similar family situations in which there has been a split among members of the family, with coldness and reticence and remoteness on one side and bewilderment on the other, which also comes out of desire to control and dominate. Hopkins was not an easy man, he wasn't soft. He was going to dominate the system, because driving him and the compulsion behind him was a communication system in design and concept. He was a designer, he was designing a corporation to do something. This problem of internal communication persisted through the entire seven years that I was there. It was softened and helped and considerably diminished through very concerted, hard efforts on the part of both sides to effect a resolution of the problem. It was decided to let the internal to let the internal communication problem carry itself for a while and work it out as best we could through a kind of a clutch arrangement known as the Communication Committee. What we have here on the blackboard is Hopkins at the head of the organization. Under Hopkins are vice-presidents in charge of legal affairs, finance, operations, engineering, administration, and communication. Running down from the communication box into the communication staff, there are, perhaps, 25 elite members of proved competence in every phase of graphic and communication skills and art (no time for beginners at this stage)--there you have the "big" staff. Now running over from the box of two vice-president-communication, we come to the Communication Committee with membership drawn from the various divisions of the corporation, primarily Convair, Electric Boat, and Canadair, then General Atomic and eventually Stromberg-Carlson. A communication committee was the clutch between the divisions and the corporate headquarters. Through the communication committee whose members were made up of each of the public relations and advertising directors at each of the divisions. The corporate communication function got its information and advice and effected its purposes. This committee met in depth for three days approximately every three months, four times a year. But there are also continuing, constant teletype, and telephone communication, letters or communication memoranda flowing all the time between the communicators. There never was a similar committee for operations or research or manufacturing or engineering but there were, of course, the fingers and the probes of communication efforts and the media of communication at work throughout every one of these particular functions. The whole corporation, at the insistence of the communication function, immediately organized itself into a teletype network so that we were in instant communication with every member of the complex. We even considered microwave relay and certain types of closed TV. These advanced media did not come into use simply because there was a time compression problem and they were extremely costly. So now at this date, about 1953, we have the corporation seeking to control a recalcitrant, huge division and other murmuring divisions and segments; a corporation seeking to establish for itself an identity, a form and purpose; a sense of destination; the ability to make a profit; to survive. The corporation had been officially named the General Dynamics Corporation because Hopkins visualized it as dealing with a number of different forces in the modern technological era and these forces he saw as submarines, aircraft, missiles, and atomic energy with peripheral activities. We evolved a statement of the corporate purpose of General Dynamics--I have here the statement of another company running to about 300 words--but we were able to compress ours: "General Dynamics today is the product not only of its own particular history but of the scientific and industrial history of the western world. As such, General Dynamics declares its corporate purpose to be the comprehensive exploration of the universe and the translation of the basic forces of nature into useful work under the sea, on the sea, on land, in the air, and in space beyond the earth's atmosphere." Now, this was very exciting to communication people and very exciting for Hopkins who says, "That is exactly what I have in mind." It was regarded without enthusiasm by some of the hard-boiled manufacturers, engineers, and merchandisers in the divisions. It was regarded with some consternation by the Defense Department, I believe. But interestingly enough it was regarded with great interest by the general public. Now, General Dynamics had problems of financing, as any other corporation has. It had problems with image, identity, and getting to be well-known. It had to answer such questions as: How do we promote ourselves from the little beginning company that we have here into another General Motors? How do we fill the scheme, the system, the complex, the design, the design pattern that Hopkins set? Can we do it through aircraft? Can we do it through missiles? We certainly can't do it through bobby pins and linotype machines but what do we pick on? What do we use? These were questions relative to the design factor; to design strategy, design tactics. What could we do that would give us an integrated design concept for the whole corporation that would move the corporation where we wanted it to move?---in the public mind; in the financial community; in the minds and activities of our largest customer, the defense department. What should we pick on? Many people said, "Our business is aircraft; after all between Convair and Canadair, ninety-eight percent of the business is aircraft. Lets promote aircraft." But we decided not to use aircraft to promote the corporate image. We decided that the leader, the image leader, the image builder for General Dynamics would be atomic energy; and it would be the peaceful uses of atomic energy and not the military uses of atomic energy. By an ingenious twist we were able rationally and ethically to use the Nautilus--the first atomic submarine--as an example of the coming peaceful uses of atomic energy; the first use of atomic energy for peaceful purposes unless a critical emergency arose. So we made the decision to concentrate on atomic energy. What we did then was to begin to design every factor of the corporate public relations, its graphics, its advertising and communication facilities around the concept of the promotion of the peaceful uses of atomic energy. As I indicated before, this was not a particularly popular subject with the general industry, no one was really doing anything in it, the government was moving strongly and actively in it and the scientists, of course, had begun their phenomenal rise in public and private influence. They were tremendously interested in applications of atomic energy to peaceful purposes simply because many of them felt that they had been drawn into an unethical act and an unethical procedure in developing this colossal force for destructive rather than constructive purposes. We decided to design a whole promotion--one that lasted very nearly seven years--around the peaceful uses of atomic energy. This basic idea was reflected in every medium at our disposal. These posters on the wall are examples of graphic design applied to a central integrating concept--a design concept for the promotion of a corporation. Hopkins had a good sense of humor, although he could be fierce, too, at times. The one thing that fascinated him and pleased him most I think, in all of this business, although it had a slightly frivolous ring to it, was the comment of the Wall Street Journal--"General Dynamics is the greatest promotion that Wall Street has ever seen." Well, perhaps there have been some bigger ones after this but he didn't think of it as a promotion. The Journal's comment amused him in a wry sort of way because it was partially true, but behind this promotion, behind this idea of getting to the power, the influence of the financial community, was the powerful ethical design concept of a corporation that would perform prodigies of useful work. And as we said in one of our early statements of purpose, we would go prospecting for new energy sources whether in sub-atomic worlds, in the atom, in the earth, in the sea, in the sun, or in the dynamics of the stars. An enterprise of new scientist, manager, engineer, shareowner groups. A huge corporate system with the research and development capabilities, the financial capacity, the courage to fit out expeditions to new and far places and to capitalize on their discoveries.

## LECTURE 3

Perhaps some of you have noticed in the current FORTUNE magazine, the feature article, "Business Learns About Learning." The subtitle is "Technology is Knocking at the Schoolhouse Door." It is an interesting exposition of the participation of various phases of industry in the educational process in which you are presently engaged. It is a sort of complement or supplement to your work--extremely interesting reading and very pertinent to what you people are up to and the part that industry may play in the promotion of your programs in your home communities.

We left the General Dynamics Corporation at the point of where a corporate purpose had been determined: - "The profitable translation of the basic forces of nature into useful work under the sea, on the sea, on the land, in the air and in space beyond the earth's atmosphere." How this was determined, why this was picked as the theme against the pressure--the internal pressure--of divisions who were much larger than the total corporate complex itself, against the pressures of outside people and suppliers who said, "You are an aircraft manufacturer; you are so listed and so you must promote aircraft." How this decision was made is much too complex to go into at this particular point. The basis of the decision was implicit in the questions: - What subject, idea, or concept would be the leader, the image builder? What would be the thing the public would be most responsive to? What could be promoted over a number of years? How could you catch the imagination of the public? How could you make people believe that here you had a red-hot new outfit that was quite different from stodgy Westinghouse and General Electric, or the other aircraft companies which had the traditional approach to product, to technology, and to the socio-economic factors which they, in fact, totally ignored? So, how does the little fellow suddenly attract attention, legitimate attention, not simply the attention of the troublesome child, or the screaming infant, or the person who does things outrageously simply to gain attention for the satisfaction of ego? You have to gain attention but it has to be legitimate attention; otherwise your welcome wears out extremely rapidly. So, the decision was made that atomic energy was the most glamourous aspect of the current scene at that time--1953--and that the corporation would use it.

In addition to the problem of promoting an image in a sea of conflicting images --from the standpoint of the small intruder in the industrial scene--there was also the complex problem of the integration of the various components of the structure itself. I hope you can see this organization chart from the first four rows. Here is the general outline of the composition of the corporation. This (diagram), of course, is standard and you have seen it probably a thousand times in reference to other corporations. Here (pointing) was a Board of Directors composed mostly of financial people; and here was the president who also acted as chairman--president, chairman, and founder in the person of Hopkins [at this time] and Frank Pace later on. Under the president comes his top staff. These boxes are:- The legal or chief counsel; the treasurer or vice-president-finance; the vice-president-engineering; vice-president-operations [really an executive vice-president's task: That of integrating all of the various operating functions of the company under one general concept or directive] and the vice-president-communication. You will see that at General Dynamics there wasn't any problem of status.

This was due to the thinking of the president of the company [in this case Hopkins] who conceived of a corporation basically composed of operations, of course. From Hopkins' point of view, however, control of a corporation could be achieved only if the chief executive officer completely controlled legal, completely controlled financial, and completely controlled internal and external communication. These three functions--legal, finance, and communication--were extensions of the presidential, titanic form. These are the extensions McLuhan talks about generally in the media sense, but here are amplifications of the powers of the president and chief executive officer. He felt that engineering and operations could go along by themselves with a minimum of monitoring from headquarters but agreed with other corporation presidents that you must have control of legal, you must have control of finance, and by control is meant such a complete interaction that these men are deputies of the presidential function. But Hopkins went beyond the then current thinking, and much of the present thinking, in saying that the communication function, also, must be an extension of the president's office; it must be directly responsible to him and must not ever go through executive vice-president or committees. Now, most corporations sandwich in here an executive vice-president who may be in charge of a number of services, for example public relations, advertising, employee relations, and community relations. What happens, of course, is that you have not an amplifier of a vital presidential function, but rather a kind of a muffler or a baffle that actually blocks, slows down, or distorts transmission of the corporate concept from the presidential brain to the adjunct communication function and the communication tactical organization whose purpose is to execute the presidential design. Now, I say president here--sometimes in a corporation, the president may be a figurehead and there may be an executive vice-president who is really the power behind these functions--because in the case of Dynamics, the chief thinker, the head corporate designer and planner was the president and chairman and his organized executive group. So Hopkins' resolution was to hold these three--legal, finance, communication--in his fist. He felt that in this way he had control of the corporation. How does Hopkins go about doing this? In looking at the chart and the basic executive orders of the corporation it is obvious that the general function of the Board of Directors is to be responsible for the total policy of the corporation. To the president or chief executive officer is delegated the responsibility for executing specifically the general policies decided on by the Board of Directors of which Hopkins was chairman or leader. In the case of General Dynamics, and I think in the case of almost any powerful organization, the Board of Directors is very much an advisory group. Although they have the legal responsibility--if there is action against the corporation, the Board is in general, responsible--actually in practice, this full authority that they may possess is delegated to their representative who is the chairman of the board or president. As you well know, every corporation has or should have a series of manuals of which the organization manual, and a manual of executive orders are the basics. It is, however, very surprising that many companies do not have organized and published policy and procedures manuals. I did some work for a large corporation a few years ago that, after fifty years had just appointed a vice-president-administration who was just beginning to develop organizational manuals and executive directives. This company has been in business for fifty years and was in the $700 million dollar a year category but they had no formal published guidelines. It is one of the great miracles of modern business that you can have an organism that operates, grows, and survives despite the fact that its structure and functions are not inter-connected by any formal, effective central nervous system. Nowadays, the competition is becoming too rough, the time compressions are becoming too stringent to get away with it. They must formalize, they must publish corporate policy, practice, and procedure. Let me read from the Dynamic organization manual:- "Active direction of General Dynamics Corporation is exercised by the Chairman of the Board and the President with the assistance of the coprorate staff." This (diagram) is the corporate staff: These five functions, here. The Chairman of the Board is the chief executive officer of the corporation. He is in full charge of, with general supervision over the business, the property and the conduct of corporate affairs; subject only to the Board of Directors. The chief executive officer is the official corporate spokesman and the representative of the corporation in its relations with the share owners, the financial community, the government and civilian customers, other organizations and the general public. He presides at all meetings of the share owners and of the Board of Directors during the absence or disability of the chairman--in this case Hopkins was both chairman and president, so if the chairman was absent, the president was too. The organization manual says, "During the absence or disability of the chairman of the board, the president shall have and perform all the powers and duties of the Chairman of the Board. Maximum responsibility for the profitable and efficient conduct of division and subsidiary operations is delegated to the executive heads of divisions with commensurate authority to act within the scope of authorized missions and subject to conformance with corporate policy and to a full, free, and timely flow of information from divisions and subsidiaries to corporate executives." Throughout the General Dynamics organization manual and executive directives, you will find again and again the phrase, "a full, free, and timely flow of information from division and subsidiaries to the corporate executives." This is the attempt to expand the central nervous system; to open the channels of communication; to get flow out and flow in. I think I should tell you that despite this constantly repeated admonition, despite the tremendous amounts of time and energy devoted to making it work, despite the organization of a special sort of servo-mechanism--the communication committee--this problem, as I indicated earlier, became a major internal communication program. The near disaster that befell Dynamics was a failure of internal communication. In this particular phase of our discussion, I think we should stick to external communication; we will cover internal somewhat later. So, in effect, the Board of Directors is an advisory board composed of financial people and some operating people including the president. At one time, General Dynamics had a board of directors. Along with the Board of Directors there was, at General Dynamics, a Board of Management. The Board of Directors performed a high policy, high financial, advisory type of task. The Board of Management was made up of the members of the president's organized executive group plus the executive heads of the divisions: The Electro Dynamic Division, which made electric motors; the Canadair subsidiary, which made fighter aircraft in Canada; Electric Boat which made nuclear powered submarines; Liquid Carbonic, a later acquisition, which made industrial gases; the Stromberg-Carlson Division, maker of Electronic equipment; the General Atomic Division, a pioneer in peaceful uses of nuclear energy and Convair (the whale that was so painfully swallowed somewhat earlier). I can give you a highlight, if you like, on the Board of Directors and how Hopkins handled them. He was a powerful man physically and mentally; and in personality. This was why he was the president and why the directors wanted him to be the president. He was a powerful man who knew very definitely and specifically what he wanted to do. He had a rough way of handling the Board of Directors, many of them members of other corporations or the heads of other corporations and comparable to him in status in industry or in commerce. But he had an enormous amount of personal charm. This he used as an instrument, sometimes as a weapon. He would call a meeting of the Board of Directors for ten o'clock in New York. This is, of course, a standard procedure and notification goes out to the members of the Board well in advance--in fact, they have a six months calender which tells them when, where, and at what time they will meet. We moved about a good deal from city to city to give full advantage to the various divisions and to enhance the impression of coherence and participation. Anyhow, let's say Hopkins calls a meeting for ten o'clock at New York. Members of the Board of Directors begin to assemble at about nine-thirty. They come in, check their coats and begin the development of that aura of good fellowship which precedes the sometimes rigorous sessions. At ten o'clock, various members look at their watches. At ten-fifteen, some directors begin pacing up and down in the anteroom. At ten-thirty there is a steady murmur--"Where is Jay?" Suddenly, one says, "He can't do this to us." Another says, "If he doesn't come in ten minutes, I'm going to leave." [Of course, he wouldn't.] At about ten-forty, the door bursts open; Hopkins comes striding in at full steam, smiling, waving his hands, radiant--every director says, "Good-morning, Jay! How are you this morning?" By force of personality, Hopkins takes these growling and recalcitrant individuals, soothes them, and pulls them together into a harmonious group. I don't know how you would define it, but I describe is as a force that exudes from the man who is in command of the situation, who knows precisely what he wants to do, how to do it and when--and not afraid of anybody.

Directors and key staff members (at times as many as twenty-five) go into the board room. Every person has his place card--a plastic triangle or wedge with his name on it. This has been carefully placed by Hopkins the night before; he adjusts the seating of directors depending on what the agenda is and how he wants to play one man off against another man, or a group against a group. There is a great deal of bunk that has been written about General Dynamics and even more nonsense about Hopkins. You may be aware of the two articles in FORTUNE some time ago, subtitled, "The Story of a Corporation that Got Out of Control." In the story was a section about Hopkins and his heavy drinking habits; Hopkins the business-day golfer; Hopkins the non-worker; and Hopkins the playboy. Anyone who worked on the top executive staff knew that Hopkins had some of the normal failures of lesser men. But they knew, also, that he consistently outworked any two men in the corporation. His golf was business golf; and under the mask of mild intoxication, he saw and heard everything and forgot nothing. I am telling you this to give you facts rather than the suppositions of sensational journalism. So, Hopkins plans how his board is to be seated because he has strategic and tactical reasons for doing it. For example, a certain item on the agenda is coming up and Hopkins wants to pit opposing views against each other--have them nullify each other, and then have another man come in with the definitive suggestion, he puts these two fellows [with the opposing points of view] together and lets them hammer at each other. At the proper time he says to the third man, "Joe, what do you think?" And then Joe's suggestion is so obviously common sense to all the directors (and perhaps also a tension-breaking compromise) that it resolves the problem. The point I would like to make here is that before this meeting--into which he breezed with such easy familiarity and cordial disregard of the directors' feelings--Hopkins had been up to three o'clock or four o'clock in the morning studying the agenda and its supporting documents. Hopkins would come in bearing two or three books himself; each of the legal, financial, engineering, operations and communication people would have similar books. Hopkins would sit here (diagram) at the table and to left and right of him, almost as in this chart, would be the staff members. Then like descender of a capital "T" itself and around it all the carefully positioned individuals. From Hopkins' position, radiating lines of force radiated throughout the complex.

So Hopkins has done his homework the night before when, possibly, magazine writers or even members of the board might suppose him to be living it up at some night club, other than the one where they were. I know that Hopkins worked when others thought he was playing because it was also my function to be his executive assistant as well as vice-president-communication for the entire corporation. For me this dual job meant virtually a twenty hour day. A great many evenings up until two and three in the morning, I spent with Hopkins as he worked on the agenda, ordered his papers and prepared the strategy and tactics of the meeting. Now, I go into this detail because I want to indicate to you how a corporation is controlled by the lines of communication--some formal and some informal.

At the meeting, Hopkins takes his agenda book, opens it and says, "Gentlemen, let's start with the first item on the agenda." Looking in his book, you could see that every single item in this long agenda list and every supporting document---making a book several inches thick and full of financial figures and data collected from the various divisions--every single one of these items has a red check mark against it. Almost every page looks as though it had been drenched in blood because of innumerable red-pencil comments, notations, and brief notes to himself as to what action to take. This book is a solid mass of notation and check marks. So he begins with the first item on the agenda, goes immediately to one of the board members and says, "In respect of this item, what is your opinion?" And this fellow says, "Jay, I don't really have any very definite opinion about this. I would just like to make a general comment." And Hopkins says, "I don't want a general statement. I want a specific recommendation from you." And the unfortunate director replies, "I don't know that I am prepared to give it." And Hopkins says, "You have not done your homework. I have. I will tell you what you should have told me." It doesn't take long--with this rather brutal technique and the baleful, bright blue eye--to kick this meeting into shape and cut out the nonsense, the horsing around. His purpose was to make these men work, to force them to think, and to get decisions from them. He knew the capabilities of each of these men. He knew their case histories; he knew their families, their wives and their children and grandchildren; we kept for him a file of 3,000 cards. On every one of these cards was the name not only of men who were heads of companies or on the

Board of Directors but a notation of every contact which he had made with them that was any significance to the corporation. This is a part of the communication process devoted to the president's office that probably isn't generally done. Every one of these cards carried a man's name and his nickname; his wife's name and her nickname; the names of his children and their ages; the clubs that he was associated with; his business interests; his financial connections; and his hobbies and activities. This file was kept updated at all times by a top notch secretarial staff working out of the president's office in New York; out of the office of the Chairman of the Board and Managing Director, [Hopkins again] of Canadair; out of the office of the chairman of the executive committee of Convair [Hopkins]. These executive secretarial staffs in New York, in Montreal, and in San Diego were hooked into and through the vice-president of communicaion through the executive assistant to the chairman as part of the intricate corporate network, the communication system that accepted Hopkins to operate and control his company and to institute the phenomenal growth of the organization that occurred over a very few years. He was most meticulous. Everything on his desk, which was simply a large splinter of the board of director's table, would have a certain spatial relationship to everything else. The clock would be here; the incoming mail folder would be there; the outgoing mail folder here; the blotter would be there; the ink stand here; the Nautilus shell, which had been given to him by some admiral would be there; family picture would be here; pencils all carefully arranged--red pencils on one side, and yellow pencils number 2 on the other side. And if people would come in, as many of them did for a while until they learned better and say, "Jay, I'm going to tell you; could we go over this together? Now, if you will just move this over here," and then go through their routine of explaining an operation. He would go through it with them and listen very patiently but as soon as the visitor had left the office everything was then moved back until it was in the spatial relationship that was appropriate. To him, this was design; everything in balance; everything in harmony. This may seem a trivial point but it really isn't, to the observer--the man who is the communicator who is serving this function, (communications is a service function, as you all know). All things concerned with the executive, who is the emobidment of the corporation, are of extreme importance. What kind of a man is he? What kind of a man are you dealing with? How do you sell him? How do you express him? This man had a design concept; a design sense; he was, I must say again, the master designer with a total concept of the corporation and had a clear idea of how it ought to be communicated. He assigned this task to the communication function. In all words and actions he was saying, "This is what I want you to do. I am teaching you fundamentals of balance, symmetry, design order."

The Board of Management, then served the president as an operational advisory group. From the communication function (diagram), the dotted line of information and advice went to all of the divisions. In the operations orders, it is stated that the divisions are semi-autonomous, with their own communications staff, their own PR people, their own operations and administrative people. However, it stipulates that--with respect to the communication committee and the communication function--a suggestion, a recommendation from the communication committee may not be disregarded. This was soft language for saying "this is an order." Every corporation of any size, has to operate as a dictatorship. I see a great deal of literature about democratic administration:- "Let's have a democratic organization; let's run our organization as a democracy." I don't think it can be done. The democratic approach was tried somewhat tentatively by Frank Pace who became president during the last days of Hopkins' fatal illness. As you know, Pace had been a high official in the government and Secretary of the Army for a while. He felt you could run a corporation in a democratic way, but events seemed to deny the feasibility of this concept. I don't think you can do it because people who are in business organizations don't want it that way. The president's job is not a popularity problem. He doesn't care. He shouldn't care how unpopular he is, he must run the corporation and he can only do it by authority and by the exercise of a certain amount of muscle. In order to execute the general program, we had decided on--using atomic energy as the leader--we had to build a staff. The vice-president-communication over here, we operated with probably a very minimal staff. What we required though, was a very high degree of competence. This was a function that I filled as vice-president of communication. This meant total responsibility for all advertising, all public relations and all shareowner relations other than non-financial. Under this function, as shown here (diagram), we had a director of advertising who was responsible for the national advertising of the corporation--that is, its placement and its budget estimates. On the dotted line theory [really the solid in phantom] he also exercised overall authority and responsibility with respect to divisions. For example, the Convair division at San Diego would be concerned with the advertising of aircraft and missiles and influencing the chief customer, the Department of Defense. Thus Convair had its own advertising program. It was our purpose at headquarters to develop men in the divisions who would be capable of executing these programs by themselves. The prime purpose of the dotted line of information and advice was to secure the integration of the divisional concept of advertising and public relations into a total image of the corporation as a whole. This was a continuing problem and a very grave one, because ultimately Dynamics had about nine divisions and every one of its divisions had its own seal and symbol. Every one had its own logotype, every one had its own ideas about how it would pursue its various support programs for sales and marketing. The problem was to have them do this to the full extent of their ability, but also to have what they were doing make inputs to the general total corporate information program so that out of all these nine divisions and diverse activities there came to the financial community, to the general public, the investing public, to the supplier, and to the customer the feeling of entity, character, and personality that was uniquely General Dynamics. This responsibility the director of advertising had with respect to advertising, of any type, in any part of the corporate effort, in any part of the divisional effort. Under him there was an advertising manager who was his right hand man or assistant and an assistant advertising manager who aided him. Under the advertising manager and under the assistant manager, there were a number of the support functions which might be characterized in another organization as the graphics group or the graphics organization. These people are in production, in design, in proposals. For instance, if you look at the Boeing organization chart for their graphics section, you find communication research, oral presentations, production services, graphics communication, presentations, film management and concept, computer-graphics, mockups and design engineering inspections, proposals and reports and editorial support and proposal support. These skilled persons are then fanned out into various plant locations. In essence, this was done at General Dynamics from a top managerial standpoint. The big staffs of this sort were at the big divisions, Convair and Canadair and Electric Boat. From the point of view of the graphics man, I would say that entry into a large corporation would preferrably be through the operating subsidiary or the operating division and its large graphics organization rather than at the top corporate level. The top corporate level is kind of the major leagues where there is much theory, much abstract concept and there is very little time to debate something; no time to learn anything. One must know what one is doing and have the background and experience to be able to say, "My judgement is this," and you can't be wrong too many times or else your position box is minus a name. So the graphic man and certainly the young man coming in from school with one skill would have to, I think, come in with the real big operating graphics group. He isn't ready yet to come into the top-level, all-pro senior league. He may eventually get there and I would think that possibly here is where the education of the generalist or the universalist would begin to pay off. As you know, I have expressed myself on this during the last couple of days, saying that I don't think any man should be sent into the commercial world without a skill. I hope this is not too much at variance with the program. Being a generalist is just great. But you can be a generalist and still have a skill that can get and keep a job. In my case, the skill was the ability to put one word after another. I really don't know what would have happened to me--I would still be punching doorbells, I suppose--if I had not had this one skill. I was reading in the August issue of FORTUNE last night about the organization of the new advertising agency, Wells-Rich-Green in New York which has taken the Braniff Aircraft account from Jack Tinker. In the article was a brief biography of Mary Wells [astonishing; a woman], president of the new agency and how the story of how the Braniff account was given to her. She was the one who had developed at her previous agency, Jack Tinker, a concept of the painted plane, the orange airplane, or the blue airplane; and the hostesses with their Italian designed costumes and the famous "airstrip" in which the hostess comes on board wearing uniform and then as she--as the plane takes off, she strips to another uniform under it; then when she is serving cocktails she wears still another uniform, and as the plane is about to land, there is yet another uniform. There is rather a wry comment to the effect that on the first Braniff flight in which the hostesses did the "airstrip," those passengers who got off at Dallas wanted to know what the girls took off after the plane took off for Houston. Mary Wells is an extremely brilliant person. Her concept of advertising is:- First you have to have the ability and the genius; then you have to have the confidence; and then you have the relaxation; that loose-jointed feeling of, "Gee, you got a problem? Hey, I have the solution!" And you give the solution. Whether her's is an ability that was developed or was given or is sheer luck, or a combination, is being debated a great deal on Madison Avenue right now. Whatever the case, there is a significant line in the comments that she made in response to the FORTUNE questions. The writers were asking her how she got into advertising and she said, "I got my first job in advertising not because I could write, but because I could type." This woman, even as a young woman, was very brilliant, with a real aggressive, sharp mind; alert and a powerhouse. But she didn't get into the advertising business [the communication business] because she had a great mind, because she could fling words around, or because she was sharp. Her only entry into the advertising business, in which she rose to the top in ten years, was through typing. She wasn't afraid to take the typing job, because she knew who she was and what she could do. Nobody else knew it, but this access, this entry, this sort of low-grade, side-door through which she went was the only way in which she could begin to get into the business she wanted to get into; into the environment that was important to her. She got the job because there was a door through which she could go. I think of graphics skills in the same way. I believe that Dr. Schwalm has suggested perhaps that when I am talking of skills, I have a different meaning than when you do. What I mean is: The ability to do something on demand and to do it creditably, whether it is photography or production, or pasteup or typing or writing. This is how I feel about the skills; they are the doors through which one may enter in order, later, to become the generalist up here in a top position where you often wish you were back there. These people (staff diagram) are the tactical people under the director of advertising. The director of advertising is the man who has had considerable experience with other corporations before he is hired into this particular job. The man who held this job at Dynamics had been with a number of marketing organizations; with Dupont and with a large house furnishings outfit [which doesn't seem likely], but he really was primarily a top-notch idea man. He didn't care too much about administration or budget making so we bolstered the administration of the function through an advertising manager who was a good administrator and a very direct no-nonsense sort of fellow who got things done and wasn't averse to dealing bluntly with the advertising agency or to demand of a division, "Get your material here." Everybody at this top level must be an idea man because the idea is the beginning of everything. If there is no idea, it doesn't make any difference how skilled you are, how technically competent, how great the research is, how mathematical the calculations; you can have all the IBM machines, all the lasers, and everything else in the modern technology. But if you don't have the idea, you don't have a program; if you don't have a merchandising device, you don't make the sales and you can't get the results you want. The communications business is still developing--a combination of the development of ideas and their dissemination. So you have the spark that ignites in the brain, the camera of the mind; and now, how do you transmit this to and through the rest of the organization? There is a parallel between this and the corporate statement, "The profitable translation of the forces of nature into useful work." The business of the communication group is the translation of ideas into useful work serving this entire managerial, corporate organizational, task-performing concept. The advertising director has got to be an idea man; he's got to have a lot of ideas because there is a great attrition of ideas. And not everybody says on the first try, "Man! That's great. We will do it!"--So he has to have a lot of ideas; and it is the duty of the vice-president in charge of communication to say, "This is good; this is good; this is out." And this is why the communication management has to have a lot of hard experience. I recall that somebody once asked the world's champion chess player--I think this man was the Russian who had beaten Capablanca [who was considered invincible]. They said to him--"How does it feel to be the world's chess champion? You went through the tournament without the loss of a game." And he said, "You forget that before I became the champion I suffered ten thousand defeats." I think this is how you get to this top position or to any of these positions. You learn only by being defeated and coming back again and winning. So these men up top have a lot of scar tissue and your generalist, your graphics man, your young boy--I think of a comment that Ty Cobb is said to have made when they were asking him about hitting 410 or 420 or something just as incredible, and he said, "Sometimes when I come to bat I almost feel sorry for the pitcher." It is typical of Cobb that it was only "sometimes" that he "almost" felt sorry for the pitcher. Old pros can't help feeling a little bit sorry, I think, to see some of these young people come into this type of aggressive, rough, occasionally nasty business without being adequately prepared. This is why I feel that the generalist, if he is too general, is going to get shot up pretty bad. I think he has to have a basic skill in order to shoot back. Our director of advertising had a degree from Pennsylvania University, Wharton School of Finance and the big question was: How could a man trained in finance be an advertising director? It turned out that it really didn't matter in his case because he was basically an idea man; a very good one, uninhibited by his business and financial training. A General Electric idea was that if you are an engineer you can do anything. So they take people who have graduated from MIT or Stevens Tech and they put them through their own engineering courses and their management courses and maybe after eight or ten years, some manager says, "We have now for some time been watching Jones on the management projection chart and he has discharged everyone of the required responsibilities very well; we have sent him out in the field into the appliance section at Louisville to learn about operations and we think it is now time to bring him back and make him advertising director. To the creative men in the communication business, this sort of training simply doesn't add up. I question whether you can ever make an advertising director or a creative man out of an engineer. That is, in the sense I'm talking about: The idea man, the creative man, or the chief communicator. The training, I think, is too different and the temperament is too different to begin with. The Director of Public Relations is a very important member of the communication group. He is not a director of publicity. I mean, he is concerned with broad gauge programs that benefit the company in the financial community, in Washington, in the industry and among the customers. The PR director is concerned eeply and directly with the preservation and development of the corporate image. He is very sensitive to things that are said against the corporation; and he is very sensitive to coming events that can be capitalized on, that the corporation can use to promote its image. Under the director --usually a former newspaper man--are special public relations assistants; in the 1953-1960 Go organization, a New York public relation manager; a Washington public relations manager; and under these managers there were news specialists and special projects people who supported the regional PR managers. Over here we had a Director of Publications, an unusual position in the communication function (diagram). This man had a Ph.D. in American history from Columbia University. The reason we had him in such an important job was not because of the Ph.D., but because he, too, was an idea man who had taken his Ph.D. and done his dissertation while he was working at the Electric Boat Division as an assistant to the general manager. He was,, in addition, an extremely good writer and a tremendous worker. I would like to emphasize again that at this level, the capacity for unremitting labor is an absolute essential. I mean that anyone going into the graphics business with the idea that this is an easy thing to do; or into the total communication picture as a universalist, thinking all they'll have to do is sit behind a table like this and "people will come to me with problems and I'll make decisions" is dead wrong. This is a fallacy, this is erroneous, it is dream stuff. The professional skill in at least one area must be there; he must have the generalist's concept of what it is all about; the ranging mind that keeps making the radar sweep of all forms of communication and information. Everything related to the corporation or the total economy, the rise of technology, must be fed into this man's mind and heart and he must be prepared to do exhausting work. There isn't any such thing as an eight hour day in the communication function. That I know about and that I have had experience with. There isn't any eight hour day in the graphic setup at Boeings where there are some 200 talented people with, in addition to advanced technical skills--a fantastic capacity for sustained work--in these categories that I have mentioned. One of their top designers, whom I know well, thinks nothing of working all the time, thinking and designing. He is back at the office at 7:00 at night and he goes home maybe at 10:00; he works on Saturday and Sunday simply because he is primarily a creative man and a superb idea man to whom ideas come all of the time. And when the idea comes, if you have any sense at all, you cannot reject it. You cannot say, "Gee whiz, good idea. I'll make a note and develop you on Monday at 8 a.m. when the plant opens." You can't do it because the god of ideas says, "I just gave you something. Use it immediately. If you don't, I'll take it away from you and I may never give you another." For the real idea man, to run dry of ideas is the end; that is disaster; sometimes it happens to you and it sometimes happens at critical points. Anyone who has really run dry of ideas at a critical point when there is a demand, "Give us an idea," and there isn't any idea will know what I mean. The Sahara Desert or Mount Everest are bliss compared to this terrible feeling of dryness and aridity. So the idea man knows the penalty of not following ideas; and this is why he goes right to the drawing board and puts it down.

What is it that makes a successful communication man? Well, a great deal of it is what makes any successful man, and one of these things is an inordinate capacity for endless and unremitting work--on the job. You saw it in the case of Hopkins and this is why that man was the head of the outfit. So in every area in which these men are working there is the idea and there is the tremendous hard work. Now, as your generalist moves up from here where he has started--if he is a high school boy, then he is a tender fellow and he is in for trouble. If he is a two year graduate, he is less tender and he is in for less trouble. If he is a four year graduate, he is in for a lot of trouble. He goes back to the high school because now he knows a great deal that isn't so. Teaching young men and women how to survive in the business world is quite a job and this, I think, must be a part of your education along with the question of ethics and propriety and what does your conscience tell you you ought to do. If you are a communicator, if you are a communications man, I think you have to have a conscience. You must have a conscience and you must be able to work very hard and you must be able to throw away a great deal of what you have learned.

The director of publications had the responsibility for developing the various publications of the corporate, the top corporate function. The annual report was first in General Dynamic's thinking with respect to communicating the general capability of the corporation. The annual report, of course, is a legal requirement that must be distributed. It must state the financial condition of the company and it must carry with it a statement by the auditors that figures reported are in accordance with accepted auditing practice. Now, over and beyond that [and we began to develop this very extensively and, of course, many other people began to do it at the same time] was the use of the annual report as a capability brochure or as a capability publication that took a much broader view of the operations and the achievements and the objectives of the company than simply the usual cut and dried statement of the president which lasted about four or five paragraphs and was signed illegibly and then was supported by all sorts of ten year charts and specific charts on sales and profits and networth and this sort of thing followed by two pages of 4-point notes that would not be read by the general public, but would be read shrewdly by the financial analyst. Now, the cultivation of the share owners as distinct from the particularly interested financial people became an important part of business tactics at this time and General Dynamics wasn't any exception--in fact, I thought we were pioneers in this particular field. This was done against great resistance by the financial people who kept insisting, "this is an annual report, a financial document. It is not a book about the company." Our point of view--that of the communication men--was that the annual report goes to some 60,000 share owners. These are all very influential people in every phase of the community and every phase of the national economy. Not only investors but people who had a profound influence on sales contacts. So when a head of another large corporation who was a supplier to the company or who was a customer of the company or the head of a large government agency writes and says, "Dear Jay: (to Hopkins) Let me compliment you on your annual report. It certainly gives an extremely interesting picture of the financial operations of the company. And I must say, too, that I had no real concept of how extensive your operations were until I saw the magnificent color photographs." You know you have an affirmation from an important customer, a man whose influence can determine the welfare of the corporation. He not only thinks the corporation is doing well financially, but he understands more about the corporation than he ever did before. So the development of the annual report became an extraordinarily vital part of the communication process. You will see as we go along--and I will begin to move into the integrated design aspects of this--how all of these staff people and how this piece of machinery is set up in order to perform operations that have a direct bearing on the purpose of the company: The profitable translation of the basic forces of nature into useful work. You will see how they contribute to the concurrent development of the image of the company and the insurance of its survival in the business, competitive jungle not as a small entity, but as a powerful entity benefiting its share owners and, of course, benefiting the people who work in it. Together with the vice-president-communications and, of course, the president himself, the director of publications had prime responsibility for doing the annual report. In Hopkin's case, this was not a matte of--"Give me a completed statement an I will sign it at 2 o'clock this afternoon." This was done at some places but not by Hopkins. As you begin to understand the character of this man, you see that Hopkins wouldn't do it. The General Dynamics report had to express him just as any of the other activities. Expressing Hopkins, expressing the design concept of the corporation as a system for performing work and the communicating of ideas. In the case of Dynamics, we burdened the director of publications not only with the annual report and some small publications, but with two other tasks. One task was the writing of speeches for executives. We used this medium very agressively to promote the total purpose of the company and the attainment of its objectives. Hopkins had a commanding personality, was not afraid of anything and in his own words was "a born actor." This meant that while he hadn't done any very extensive public speaking before the General Dynamics communication design became effective, he was perfectly willing to be the spokesman for the company and to undertake the very heavy task of key speech-making to promote the company and its objectives. Because of his commanding presence, his powerful voice, and the personal force that seemed to radiate from him, he was an ideal subject. There were some speech problems like the "ahs" we took out. He was a better student than I and he learned to speak very effectively by practicing with a tape recorder and playing his speeches back. This is now a standard practice. Many executives, however, are reluctant to hear and see themselves. But Hopkins would come in in the morning and say, "I just listened to my speech and it is awful, awful! We will have to correct it." And he would work on it. When he made his appearance, his speech was polished and impressive. Now, these speeches were not ordinary speeches and were not the sort of thing you mimeograph and hand out to the press; and as the man talks, the people in the press section say to you --sitting there with them--"What it says here isn't what he is saying up there." Very often this is the case. The PR department writes the speech for the president and the president gets up and says, "My writers have given me something that I think is quite inadequate (or inappropriate). I am going to throw this speech away and talk to you right straight from the shoulder." This kills the PR department. I mean the injury here to the tissue is so great that the whole department may go into shock for weeks. But presidents tend to do this. Why, I don't know. I think that they look at TV too much or they look at comics who are geniuses. Bob Hope can throw the script and the writers away because they know he doesn't mean it. They themselves have written the line in for him to throw away. But these fellows, the presidents of companies are not generally Bob Hope. What we wanted to do with the speeches was to make a tie-up with what we had adopted as our central theme:- The glamourous issue of the promotion of the peaceful uses of atomic energy. These speeches were more than speeches, they were essays and this is why this particular man--the director of publications--with his academic background, his ability to write, his capacity for work, became a very important part of the group. We drafted the speeches and then we would go to Hopkins and he would amend them to get in the points he wanted to have presented. Then we re-drafted the speech and began to cut it down. Another part of the group would have previously--as much as six months before--found a proper event for a Hopkins speech. To secure his presence there was part of the public relations job and a very difficult one; you can't just say to the New York Society of Security Analysts, "Our man would like to speak to you on November 15. Please have the hall ready." I mean, you don't do this. They have a number of dates; and what you must do is to promote the inquiry from them saying, "This is May; could Hopkins talk to us in October?" We would say, "Great, fine. Full scale presentation?" And they would say, "Oh yes, you bet." Or annual meetings of the New York Economic Society or the Detroit Economic Society or the National Association of Manufacturers or the Franklin Society in Philadelphia. These are all events which we programmed into our total design concept. Events at which Hopkins would make an appearance in order to make a speech that also would be an event. So, our concern is not only the occasion but the content of the speech and its marketing afterwards. Hopkins makes the speech; it is reported fully in the papers because all the papers have been given a copy of the document before he speaks and because he has (by calculation) hit on a controversial point. Now the timing problems for this sort of thing are simply terrific. Much like the impacting on the moon. You are starting way off here and you are shooting out to there and by the time your message or missile arrives here, the event should be within the target area. By the event, I mean both the occasion and timing of the public news about a certain aspect of whatever it is that you are going to talk about. This sounds a little abstruse but it isn't really. It is the same sort of timing that occurs in the preparation of advertising in which you try to plot and anticipate a public mood that may be generated now but is not going to be effective or in full scope or scale until six months from now. In advertising you have, on color, a four weeks minimum closing date, then you have preparation of copy, art, engravings, proofs, corrections, client's O.K.'s, or revisions; after all this, you have to feel that at the time this advertisement hits the media, that it is going to be particularly appropriate, of special interest to the market. The timing of the speeches was even more difficult because the speech is a rifle shot; advertising generally is a shotgun effect. The speech takes place and is given a play in the newspapers and then immediately--because it has already been printed--the speech is in circulation. It is distributed instantly to the 3,000 card list that we talked about plus lists submitted by the operating divisions and perhaps to even special lists of opinion leaders; and, of course, to all of the newspapers, magazines, radio, and TV media throughout the country. In one of Hopkins' first important speeches, he called for a plan for the development of international atomic energy under the leadership of American industry. This was made at the 59th Annual Congress of American Industry of the National Association of Manufacturers at the Waldorf Astoria Hotel. There were 1200 people present. This speech was made and merchandised in the way I told you about. What happened also was that we asked William Lawrence, the science editor of the New York Times and a friend of our public relations director, to come to the speech. Lawrence, a very brilliant fellow, said, "Yes, I'll come to it but I don't want to sit out in the audience. I'm going to sit in the wings. I don't know how good your man is, but I'll listen to him. If I don't like what he says, I can leave and nobody will notice it." So, Lawrence sat in the wings while Hopkins made the speech. The next day there appeared in the New York Times a full-scale lead editorial which told how "American industry was urged yesterday to undertake a far-reaching atomic Marshall plan to raise the health, wealth, and happiness of mankind throughout the free world by enabling it to share in the virtually unlimited potentialities of power within the atom. The proposal, which goes far beyond the Atoms for Peace Plan of President Eisenhower, was outlined by John Jay Hopkins, Chairman and President of General Dynamics Corporation . . . ." I don't know how Eisenhower felt about it, but it made a tremendous furor and, of course, we immediately got hold of Lawrence's editorial and another editorial from the Los Angeles Times and still another editorial from the Christian Science Monitor--all stemming out of this event --and put them up in a booklet. Then in our further development of this plan which we had sweated out over about a six week period, we merchandised the speech and the editorials in about every place we could possibly think of. So, so much for the corporate publications.

Now the Communication Committee which I referred to before was made up of twenty-three members of the corporate staff. An advertising director and public director plus a key member of the staff from everyone of the operating divisions. The Communication Committee, meeting about four times a year served as an advisory group to the vice-president-communication who was the chairman of it. The committee also served--even more importantly--as an integrating and central device. We needed to find out what the division communicator men were doing, and to develop with them methods for getting the corporate objectives integrated into their work; we also needed to get them under control. We felt that if we knew--if they were on the committee that we could indoctrinate them with the idea that this was really one corporation and one concept and that they were as much a part of it as the corporate office. We were trying to break down their "civil war" or "the south will rise again" attitude which they tended not to forget. Having been independent outfits before, they kept reverting to this pattern. So the Communications Committee became an information device and through that a coordination and control device. Throughout the whole concept of corporate communication, there are the two other words beginning with the letter "c"--coordination and control. If there is not a fairly well-developed communications system, there will not be the necessary coordination of all the powers of the corporation directed toward attainment of its chief objectives. There certainly will not be the control of the corporation, which I talked about before, under the Hopkins concept that the legal, financial, and communication functions are the control functions in the corporation. Now, in the implementation of our plan, in putting our plan across, in promoting atomic energy and thus gaining image status for the company and revitalizing or strengthening the whole corporate concept internally, as well as externally and pulling it together--one of the most important factors was the design consultant. The choice of the design consultant in the case of Dynamics was a very happy one and in some sense, rather accidental. When I came into the corporation, General Dynamics did not have a design consultant. There was, however, a designer named Eric Nitsche, who was well-known, an international designer, born in Switzerland who had done work for many, many companies including Standard Oil. He was working as sort of a consultant art director to the advertising agency we had at that time. What was being produced was good but it wasn't really great because first, there was no central concept of the corporation and, second, there was between the design consultant and the communication function in the corporation one of those baffles I was talking about before. That baffle was the advertising agency. The design consultant had to work through the agency which often said, "That isn't too good; let's not do that. We have another idea--let's do it our way." So they would do it their way. Then, it would go to the vice-president-communication who would say, "I don't understand this, it seems very average to me. Not enough idea in it; not enough attention to what we are after. Can't we get something better?"

Eventually, we removed the baffle. We didn't fire the advertising agency, although later on it was changed. What we did was to use the advertising agency for placement of advertisements, development of media schedules and a production of the finished engravings and typography --all of those processes with which the company was not deeply concerned. There came to be a very close working relationship between the design consultant and the vice-president-communication and the director of publication. The vice-president-communication and his associates became the copywriters on all of the material that was promoted through the company and the design consultant became their art director. The development of an inside creative team ultimately had a profound influence on the corporation's course. It was through an integrated design concept that we were able to take the subject of atomic energy and promote it along the lines that we had thought out; and to make it a successful program. We concluded, with one designer, that if we were going to make an impact we must have an extraordinary design; it must be extremely brilliant, it must be exposed in every part of the world; and it must be integrated with the speeches, with the annual report, with the advertising, with every activity of the company. The development of a communication program generally goes through eight phases:- To begin with, exploration or reconaissance. What are the factors in the problem?--an attempt to define the problem; second, problem analysis and recommendation; third, strategy and tactics; fourth, cost estimates; fifth, the action; sixth, feedback--what do you hear from outside, how did it go, what is the reaction; seventh, review--this means a review by the corporate staff of the tactics, the cost and the ultimate effect of the action. Review means re-analysis--were you on target? Were you out of line on your cost estimates: Did the action backfire? Was it what you anticipated it would be? And then a recycle--number eight--in which you begin all over again the process of stating the problem; analyzing the problem; isolating the factors of the problem; and then making the analysis of the system and its demands. The use of the designer and of graphics --extraordinary graphics treatment-- throughout the whole corporation was the key to this rather interesting case history in visual communication. The important thing about the General Dynamics communication program was that first, it was an integrated design right from the concept of the corporation through the purposeful choice of atomic energy as the leading idea and then the integration of the staff around it, the bringing together of the total communication function, the hiring of the design consultant with the requisite skills. Someone asked the question the other day--what do you think of American designers compared to European or even Asian designers. My off-hand comment is that while there are some very top American designers like Charles Eames or Elliott Noyes or Lester Bean--people like that --on the whole, I would say that my impression is that there are far better schools and better trained designers on the European, Swiss, German, Scandinavian side and from the Japanese side than there are here. It may be, of course, that the training of these people and the way they express their ideas gives to their work a certain flair and foreign charm. In Switzerland, perhaps American designers are more popular than Swiss designers because of the factor of the strangeness of the different culture. But anyhow, we chose Swiss-trained Eric Nitsche designer: First, because he was brilliant; second, because he was full of ideas; and third, because he was simply a colossal worker. I would like to revert for a moment to be sure that we do understand the purpose of the corporation. The generalist in communication, the universalist, the communicator must be thinking all the time about the environment in which he exists, in respect to the corporation of which he is a part. This corporation is moving; the communicator is moving back and forth within the moving corporation, carried inexorably to a destination. He must know the nature of the business environment. I can't stress too strongly that this knowledge must be a part of your generalist's education. Of course, all the things you teach him about communication in school, he is going to learn on an amplified scale as soon as he gets into the corporation or the business organization. There conditions will not be precisely as outlined on the blackboard or as stated in the book. Perhaps we can discuss at some length the difference between theory--assumptions made in school--and the reality of practice; just what is the difference between the school book, or the classroom, and the organization where the boss may be a rough guy; or the emergencies may be very great; or anxiety may persist; or where there are top-grade professionals who don't have any time to waste on younger people--all of these things that are the hard facts of what you must do to get along in an alien environment. It isn't quite the way the map said it was. You don't wind up here; you wind up over there and over there and here where you wind up is full of swampland instead of sunny fields. What does the young generalist do when he gets to this point? I think you would do well to make clear--as clear as possible--the contrast between the reality of the marketplace and the business organization and the theory and sometimes the fancy of the textbooks.

For instance, General Dynamics corporation is an operating corporation; not a holding corporation. I go into this necessity for knowing the environment so exhaustively, using General Dynamics as an example because one learns most easily by looking at case histories. If General Dynamics is in transition from being a military contractor to concentrating on domestic interests only--to being a military-commercial-consumer contractor producing for international and national markets. It therefore must cultivate present and future commercial consumer markets over an extraordinarily wide spectrum. The cultivation and preparation of these customers and these markets must be made against natural inertial, indifference and aggressive competition. It is a tremendous task. This task cannot be undertaken except with the expectation of spending considerable sums of money on information, educational and promotional programs of broadest scope and most decisive impact. At General Dynamics, we found that the communicator's task could not be performed under nine division symbols and the corporate symbol, ten in all. This was the corporation's basic communication problem:- Not only the projection of the image of the company, not only the development of customers and securing of income that would result in profit--but the integration and coordination of nine separate divisions with different entities, different symbols, different logotypes, so that the general public, the financial community, the over-all customer will not say, "I don't understand all of this. I don't understand what G.D. is. It is a very confusing picture." There was not only this diversity, this confusion between divisions within the corporation, but in the field there were scores--hundreds--of other corporation and entities seeking to enlist the attention of the very people that we also were after. These tasks could not be deformed under ten symbols; the impact was too diffuse, and the cost too great. Now this struggle to make these people realize that divisions must support not only divisional products and sales effort, but also the corporate name and identity, that everything must ultimately feed the corporate concept--was, as I have indicated, unremitting and very difficult. One doesn't really understand why this should be so, but there were powerful emotional factors here. I recall that at one of the communication committee meetings we had a blank sheet on the board. At the opening of the meeting, I pulled the sheet off and on it was simply the "GD" corporate symbol. I said, "Gentlemen, this will be, ultimately, your one symbol." And the communication director put his head down on the table and said, "Oh, God! No!" Why there was this disturbing emotional dedication to the provincial, parochial point of view, I don't know. But it was a tremendous problem. It was civil war. Divisions are not the corporation: They cannot think, look, or speak as the corporation. The corporation identity, personality, scope, philosophy, purpose must be made paramount through identifiable corporate communication and promotion programs. The corporate communication program--reflecting the corporate concept developed and maintained by the directors, the chairman and the president--is the corporate look. The communication program is the corporate voice, the corporate thought, the corporate identity, and the lasting corporate image. Let me read this paragraph from our budget proposal for 1960: "Against today's and tomorrow's competition for minds and markets, against the requirements that within the next year and a half the corporation's stock must be higher than the highest in history, we cannot afford to do less than with the shrewdest calculation thrown into the corporate educational, informational, promotional, effort the maximum amounts that we dare to expend." We didn't dare to expend the maximum amounts, although we expended a good deal of them. This then was one of the internal problems of pulling together a great complex into one unit--not trying to hit with separate, extended fingers, but by pulling them into one fist to hit with solidity and impact wherever you wish. The corporate statement of corporate policy objectives read:- "In order to develop and maintain a dynamic and imaginative communication program responsive to the needs of the corporation the following objectives are stated. (1) To identify the corporation as a distinct corporate entity; (2) Strongly and persistently and ingeniously by radical and original methods to promote the concept of the corporation as set forth in the statement of corporate purpose; (3) To emphasize the diversity and superiority of the corporation's products. To develop and maintain employee-divisional-community-customer-supplier-share owner support; to do exploratory and applied research in communication theory and set standards of communication practice. The communication committee will make recommendations to the vice-president of communication in such areas as corporate and divisional identification; advertising as a function of marketing; public relations aspects of legal affairs; employee-share owner and community relations; the nature and size of the corporate and divisional communication connected tasks; appraising the methods, practices, and procedures and personnel by which and through which these tasks shall be performed; appropriate procedures for coordination and integration of the corporate and divisional communications function, corporate division and communication budget." Well, this is a lot of stuff, a lot of organization; a lot of programming and planning. And the question is, "What came out?" Well, what came out began really with the event of the first introduction of Hopkins as a speaker on the national stage. The atomic energy plan, the so-called Atomic Marshall Plan, was the opening gun in our integrated corporate design campaign. Along with that there was the development of a book-- THE ATOMIC REVOLUTION. This was published with a little tab that briefly described it and signed by Gordon Dean, the former chairman of the U. S. Atomic Energy Commision who had become a vice-president of General Dynamics. Now you must try to put your minds back to this period when splitting the atom and the subsequent atomic revolution were staggering events. As staggering, for instance, as the exploration of the Moon and Mars may be now. Perhaps even greater than the exploration of space because of the implications of immediate peaceful uses and power applications. THE ATOMIC REVOLUTION was done in a comic book format. It started with the beginning of the discovery of radio-activity, the definition of atomic fission and atomic fusion, the development of peaceful manufacturing uses, the development of power into propulsion, into international aspects and then into medical and scientific research through isotopes and agriculture. This little book was the first really definitive exposition from a popular standpoint of what atomic energy could and should mean to manufacturing, to general industry, to service functions, and to the public at large. Then came the event of Hopkin's going to Japan. We went to Japan for a number of reasons. One was, of course, because Japan is the central productive unit, industrial unit, in Asia. Second, because Japan had been bombed horribly. Third, because this was another attention device, off-beat and eccentric, but sure of gaining publicity in all media. You don't make news by doing the usual, you make news by doing the unusual. The "man bites dog" definition still holds true. So Hopkins prepared to go to Japan. The State Department attempted to block us from going to Japan on the basis that we would be assasinated. This interested Hopkins very much--he didn't believe it. So we went and he made a speech there called, "Atoms for Asia." As we went to the hall in the big central park in Tokyo, the students began to crowd around us. As we entered the hall, there were, I would guess, about 2,000 or 3,000 students outside the hall and we had to go through the center of this group and into the hall. The hall itself held about 3,000 people. There was a lot of muttering and a lot of threatening and a lot of comment about the Americans and the industrialists and the danger of the atom bomb:- "Was this man promoting the idea that we would actually have in the midst of our city an atomic energy installation that might blow up at any minute?" We had carefully prepared the Hopkin's speech. At the end of it, we put a quotation from a Japanese poem which we had found in the ANTHOLOGY OF WORLD POETRY. When the translator saw the text he became very excited and said, "This is one of the classic poems of Japanese literature. There are four ways in which it can be translated. I shall give all four." The Japanese translation was about one and a half times longer than the American original so Hopkins would speak a paragraph and the translator would take one and a half times longer to give the translation. There wasn't a single sound in the hall during the entire dual speech. Nobody coughed, nobody whispered, nobody rustled papers; you could shut your eyes and you would think that except for the velvety feeling of the sound absorption by the audience, you would think that he was talking to an empty auditorium. I have never experienced anything like it --really extraordinary. There was no indication of acceptance, rejection, or anything else. Prior to this when Ernest Lawrence, the Nobel Prize winner and Larry Hafetad, the present research director of General Motors, whom we had asked to come along were making their speeches, my Japanese contact and I walked out the door into the area outside the hall and at once wished we hadn't. It was simply solid with students. We walked through the crowd to a TV monitor that had been placed out there; watched the speakers and then discovered we could hardly get back because of the closing in, the gentle sidling together of the mob. If you have ever walked through such a mob, you know exactly what this means; it is an extremely disconcerting feeling of menace and of hostility, a lack of recognition. When we finally got back into the hall, Hopkins began his speech; with translation, it took about an hour and forty-five minutes. At the end, as he finished the Japanese poem and the translator ended the last of his, there was a sudden cascade of noise, of sound, of applause, of voice. It was just like walking suddenly from a silent room into a waterfall. It was thunderous; for minutes. As we left the hall, the attitude and the sudden change in the mob was miraculous. They were cheering Hopkins, cheering the group, and cheering Lawrence and Hafetad. So we went back to the hotel. This incident was completely reported in the American press; it made a tremendous hit in Japan. From Japan we went immediately to Switzerland, to the first international conference on atomic energy, the Atoms for Peace Conference developed by the U. S. Government and the United Nations. There the problem was very simple. There were thousands of scientists gathered at Geneva and there was a tremendous commercial exhibit down town. Hopkin's only comment to us was, "Take over Geneva." We did. We took it over with graphic design and we took it over with posters. Nitsche, Evans, the advertising director, and Niven, the publications director had been working on the program while the rest of us were in Japan. We hit Geneva with a whole series of the atomic energy posters that you saw the other day headed "Atoms for Peace" in English, in French, in German, in Hindi and even in Russian. This was regarded by the Russians as dirty pool. But we were able to survive their disapproval. We had another problem in the commercial exhibit. Because this was an "Atoms for Peace" conference, the U. N. and all the others said, "You absolutely cannot talk about your lethal submarine." All the other manufacturers were talking about their hardware. General Electric had a massive display about the size of this lecture hall; Westinghouse had one as big; and scores of others displayed intricate atomic energy devices and demonstrated the production of electric power through atomic energy. We didn't have anything. We didn't have any hardware because our General Atomic Division had just been organized and it was only a paper-producing outfit at the moment. The only hardware that we had was the nuclear powered submarine, the Nautilus. So, Nitsche designed a beautiful little pavillion, almost like a super gazebo. In front, on a single pronged stand, was a twelve foot boat model of the Nautilus. It was a pattern maker's model. As you know, these fellows do the best work in the world with wood. Beautifully finished and polished, it seemed like something out of the future sitting there. Behind the model of the submarine were panels. On each of these panels in Arabic, in Hindi, in German, in French, in Russian, in English, and in Japanese was the statement from the Bible--"They shall beat their swords into plowshares and there shall not be war any more." The Russian delegation came to our display immediately the first day the commercial exhibition opened and stood in front of it and made a demonstration. We were warned that we would get a request from the commercial exhibit people that we must get rid of the submarine. Fortunately, with astounding timeliness, a statement was issued that afternoon by Pope Pius which said, "I regard the Nautilus submarine as the first--as man's first application of atomic energy for peaceful uses." Overnight we lettered the Pope's statement on a placard and put it in front of the Nautilus.

When the Russian delegation came around the next day to renew their protest, they were confronted by the Pope's statement. The protest died.

## LECTURE 4

We ended our session yesterday with the comment of Pope Pius describing the Nautilus as "the first attempt to propel a ship by means of nuclear energy, at last putting that force to the service of man, not to the destruction of mankind," much to the confusion of the Russian delegation. Before we start the session today which will go into some specifics of our program, I have one question from the group. This question is: "School systems are, in a sense, large corporations. Their communications, internal and external, rate very low in effectiveness. The idea man often is mistrusted rather than acclaimed in the educational system. Does the speaker have any ideas as to how these failures can be corrected?" I would be very happy to go into that in detail this afternoon. It brings to mind a cartoon that I saw a number of years ago in a business publication. Men were running in all directions and in the center from which they were all fanning out in desperate haste was a bomb. And the bomb was labelled "New Idea." That this appeared in a business publication is commentary enough, I think, on the question. The presence of a new idea, a really new idea, is a shattering force. It disrupts all sorts of traditional methods and techniques; it upsets people who have been sleeping at their desks; and it annoys executives who have already had a rigid pattern set up and who want it to continue to operate as they always have. The idea man is in a difficult position not only in the schools; he is in a difficult position in industry. The chief characteristic of the real communicator, the real creative man, is his capacity to develop new ideas. This again reverts to our comment of the other day, to the effect that anyone not willing to work very hard and to suffer a lot of defeats and to engage in a constant struggle is not going to survive as a communicator in any significant phase of the business, commercial, or industrial world. He may survive in an insignificant way located securely in some storm cellar down in the bottom of a large group, but generally the pressures of the crash and crises of the system in which he will operate are such that he will eventually find himself enroute to some other even safer haven. The way of the idea man is extremely difficult. There isn't any peace for him and I don't think anybody should encourage him to think that he is going to find his new and brilliant ideas accepted by industry the moment they are presented. I keep reading articles--and have over many years --about how business welcomes new ideas. I would say that if you examined what actually happens, you would see business does not welcome new ideas; that industry reluctantly gives way to new ideas. Now, occasionally in the second, third, fifth, or tenth spot in a particular industry where a real live-wire president has got an organization galvanized into action, you may find they are willing to take the risk and develop new ideas and push them, promote them, and put their reputations, their lives, their careers, at hazard because they want to move up from the position they are in, to the top; with more money, more profits, a better living for them than they have previously enjoyed and, of course, the satisfaction of tremendous achievement. While we are at this, I must say that I have given you rather a condensed version of what we went through; apparently from what I have been telling you, everything proceeded in sequence, one successful event from another. This in general was true. Internally, however, there was turmoil and struggle; all kinds of block and obstacles. Recently, in thinking about the difficulty of making significant progress in connection with another organization, I developed--perhaps this has been done before--but, I developed for my own interest, what I call a "progress block." It is a little cube or block made of cardboard and covered with foil. A sort of desk ornament or a "hand stone." On one side it says, "Costs Too Much"; on another side, "We've Never Done It Before"; on the third side it says, "Too Late Now"; on the fourth side it says, "We Are Engineers"; on the fifth side it says, "Barnum and Bailey," that is, too circusy; on the sixth, "He Won't Like It," the objections, the reasons why it can't be done, that the idea man, the creative man, the communicator is liable to run into. Of these, perhaps the most common is, "We've Never Done It Before." It seems incredible, as we sit here looking at the theory of communication, that these negatives can actually have the genuine impact they do. "We Have Never Done It Before." "Too Late Now." Too late now means that the organization has already fixed on a pattern and a procedure and is using it as a power play. If you come in with a new idea it is "too late now" to really to do it, because "we don't have time" and "it may cost too much"; besides it is rather circusy or Hollywood and finally, "It wasn't invented here." These are all reasons for not doing it because, in fact, the new idea interferes with somebody's or some group's interest. So, the procedure of developing and getting out into production and merchandizing on a broad scale, any new concept or a new idea is fraught with trouble and characterized by constant struggle. This means, of course, that the communicator, the man that you are beginning to develop, the generalist, the fellow who knows a good deal about everything, and who may perhaps have one skill has got to have a couple of other skills: and one of the skills has got to be the ability to take these frustrations, to take these disappointments, to take these slaps, to take these rewrites of copy and editing of art and changing of pattern as part of the normal behavior of business. The young communicator has got to be able to overcome these progress blocks and do so with some degree of graciousness; he must say to himself--"As a real idea man, as a real communicator, I've got a million of them!" To some extent, he must be ready to practice Bob Hope's scatter technique of throwing away one joke after another, the shotgun effect, until he really hits with one that provokes the proper audience response. You must have a good many of them. I mentioned to a few of the members the other day, a skill that I had not included in some of my discussions about the need for the communicator to have one skill in addition to his general knowledge. I recall a man with whom I had had some contact. A very engaging fellow, a red haired, rolypoly individual who never seemed to have an specific skill. He didn't seem to be able to write well, he didn't seem to be able to speak too well, he didn't seem to have any idea of design or pattern development, he wasn't a research man. He certainly didn't seem to know anything about finance. And yet, he was the vice-president of a very large advertising agency. And I wondered for a couple of years what it was that made this man so important. How did he become the vice-president without a skill? And I finally discovered--and this was a good lesson I thought--that his skill was inside himself and had nothing to do with what he had learned. It was simply the fact that when this man came into a group, into a room, or engaged in a discussion with anyone from the president down to the account executives and the client, he made people feel good. People liked to have him around. He exercised, as he entered the room, a sort of a pleasant influence. This is an intangible, non-verbal, non-visual projection of communication. He made people feel good and why, I don't really know; when Taylor entered the room, you just felt good. To creative people, this is a tremendous asset, because generally people entering rooms make them feel bad. They all come to the creative man with a problem or a criticism or with some sudden revision of a deadline that makes it more impossible to achieve than it ever was before. So, if in your recommendation of a student, the only thing you can say is, "He's an awfully nice guy," say it; because business, and the communication business especially, needs an awful lot of nice guys.

We discussed yesterday the function of communication as an information net. And the communicator as the steersman who is responsible for the coordination and control of certain phases of the organization's development and destination, or as a catalyst. And we discussed at some length the chief executive, or the organized executive group which is the executive and his chief vice-presidents. The emphasis on Hopkins as a man may seem a bit overstressed; it may seem like hero worship or the cult of the individual; the cult of personality, I believe the U.S.S.R. calls it. It is easy to do to a certain extent simply because many of these large organizations are extensions of the man himself. And the chief executive is an impersonal being, really. He is a different fellow sometimes in his private and social life, but he does tend to embody the corporation and it is only in order to fix this sort of thing in one's mind that it is worthwhile saying the man's name again and again; it should help us remember that communication is a human affair. Machines-to-machine communication doesn't mean anything. That is, it doesn't mean anything now; it may mean something later. But at the control console, behind the machine is the human being. Behind all the intricate communication networks that are being developed through electronic technology and the machine--the computer--it is the programmer who is the basic, individual force. Now many programmers establish a man-machine rapport that is fantastic. One of them, I believe, describes the relationship as somewhat similar to that of the accomplished tennis player who, after a few games, begins to feel that he and the tennis racket are one. This also noted by Zen masters in the various arts in Japan, particularly that of swordsmanship where the feeling is--after one has warmed to the bout--that the sword and the man are one. In some cases, they believe it isn't you and it isn't the sword; it is something else that is manipulating you and your opponent. The rapport between man and machine is such that the programmers begin to treat the computers as personalities; they talk to them and they have a sort of emotional, symbiotic relationship. However, this is something rare now and doesn't particularly concern us. We are concerned with the fact that communication is a human business and an extremely complex one; it is not simply verbal, not simply visual, but has also the non-verbal, non-visual, emanations of personality or of feeling or psychic sense. Hopkins is one case; my friend, the jolly fellow, Taylor is another.

External communication in the large corporation might be said--if you will--to start with advertising. Major factors of advertising are image advertising; industrial advertising; commercial advertising; financial advertising; special recruitment; and special promotion advertising. What we have been talking about here at the moment is image advertising; we have discussed an example of it: A problem stated, a definition agreed on, a course decided upon and the tactics determined, the staff organized and the peripheral production design and media elements factored into it. Concurrently with the Geneva affair--to give an example --the "Atoms for Peace" promotion in which, through the posters you saw on the wall the other day, we took over the city and also, we hoped, the emotions and somewhat the minds of the hundreds of visiting scientists, industrialists, and government people--concurrently with that, we began to run an international advertising campaign. The advertising campaign developed out of the posters. Its subject was:- "Exploring the Universe." This was again an extrapolation from the original idea of making atomic energy our prestige leader--the line-leader of all the products or services we were developing; of using atomic energy to focus attention on the corporation. We were integrating this theme with our speeches and with our publications through the president's office, through other members of the organization and through the divisions. We began our merchandising with the development of "Atoms for Peace" posters. Then we began to move into the "exploring the universe" campaign and began to use extraordinarily attention-strong, attention-attraction designs. When we presented our layouts at the first meeting we had with the Board of Directors, the comment by one influential member was--"I don't understand this stuff. It looks to me like a bunch of crazy, mixed up traffic lights." He was right, I suppose, in one sense; but the interesting thing was that it didn't look that way to the general public or to the people we were trying to interest. To the general public it looked like symbols of forces, modern atomic, electronic forces. We began to move then into more specific presentations of what the corporation was doing--still within the general theme of "exploring the universe." In these later advertisements, we dealt with solar energy, with electrical energy, with nuclear energy, the collision of the sub-atomic particles [which was blown up into a particularly effective poster] with the development of the missile into the space ship, and the exploratory devices such as you are reading about in today's papers. Along with this we did posters and advertisements on the subsea--the undersea--in which we indicated that in the future the development of the resources of the undersea was going to be a tremendously significant activity. Now, a good deal of this was gazing into the future. In 1955-56-57, oceanography was not a very interesting, not a very important business. Atomic energy was regarded as pretty far out. This comes back to the timing business I was talking about before; where you estimate the impact of the event that will take place five months or six months later. You must plan and execute your program now; get your stuff into production, into print, so that you can release it not a minute too soon or a second too late. Then you watch it just as anxiously as the satellite team in the blockhouse and in the lab watches the radar screen and the control panels to see if you are going to make the impact or miss the orbit. Sometimes you make a hard landing when you should have made a soft landing; and sometimes the vehicle goes completely out of the field of observation. These failures are just as agonizing to the creative people as they are to the men whose expressions you have seen in the blockhouses. And the same emotional feeling is behind the launching of the campaign as there is behind the launching of an astronaut--the feeling of "go baby, go!" Sometimes baby doesn't go. Along with this rather extraordinarily circus or Hollywood or Barnum and Bailey type of design concept, we had another objective. It was very necessary to us to recruit high level scientists and high level physicists for the General Atomic Division beginning to develop under the leadership of Freddie de Hoffmann, the 33 year old genius. DeHoffmann graduated from Harvard at sixteen or seventeen, I think, something like that and he was an Austrian and a theoretical, mathematical physicist who had been Edward Teller's deputy on the hydrogen bomb project. We had a problem recruiting a number of different types of men in a number of disciplines that deHoffmann wanted to set up in his General Atomic Division laboratory. We debated the sort of recruiting advertising we would use. You know the general look of recruitment advertisement --I think what you would call, in vulgar language, in the trade, "shlock" advertising--big, fat, black type that says, "Career Openings at . . . Co." or Engineers Wanted"---or "Tired of the Heat in New York? San Diego Offers You Palm Trees and Year 'Round Swimming," this sort of business. It didn't seem to us the right thing to do. I must point out that recruiting advertising sometimes is a very sizeable part of the corporation's expenditure and it is controlled very rigidly by the division. They don't like recruiting advertising to get to the general corporate level because this gives them a chance to beef up their advertising budget. They also, for practical reasons, often need to be responsive to local personnel needs and resources. In this case, however, the talent we were after might be in Canada, England, or Austria; it was expensive talent; extremely alert, sensitive, and intelligent. Other corporations, General Electric and Westinghouse through prestige and the burning of the "GE" and "W" image into people's minds had created an impression of greatness and of opportunity which we simply could not match. So we began to run the "Exploring the Universe" advertisements that I was talking about --on the nature of the universe, the fourth state of matter (plasma), the energetic sea (the development of oceanographic resources), solar energy, ballistic missiles, the possible exploration of space--all of these things which verged slightly toward the science fiction side, but which we checked very carefully with all of our scientific people and were absolutely 100 per cent solid from a factual standpoint and the standpoint of the state of the art. We began to run these ads and we got a lot of opposition from some of the scientists, again on the basis of "Hollywood," "Barnum and Bailey," "Never Done This Before," "You will Make Us a Laughing Stock,"--apparently being made a laughing stock is pretty nearly the worst that can happen to you as a nuclear physicist. You must not be a laughing stock. But fortunately--as with the intervention of the Pope--the returns began to come in. So one day deHoffmann came in and he said--"Say, you know we landed John "X" today. We've been after him for months and you know why we got him?" I said, "No." He said, "I hate to admit this, but I must be honest--we got him through one of the advertisements." I said, "How is that possible?" He said, "John didn't read it, but his wife did. He had been considering a number of offers and we were one of them, but we were way down on a list with MIT, G.E., Westinghouse, and a lot of government positions and they were talking it over one night and his wife said, 'I know where you should go' and this fellow said, 'where?' and she said, G.D., in the General Atomic Division.' He said, 'What for? Why go there?' She said, 'I just read an ad of theirs today that I thought was the most imaginative and stimulating ad I have ever seen and I feel that if you go with this company you are going to do some very important work and you are going to be very happy and we are going to go somewhere very important very fast.'" That is how we got John "X." Now, this wife-multiplier was an interesting development and outside general advertising thinking. We didn't know really, exactly, what we were doing. We were aiming at the scientist himself. We did get some men this way, but the other route, the influence of the wife on the scientist, was decisive. The appeal to her imagination, and her intuitive understanding that the person with whom her life was linked had one very important consideration in his whole career--that he would be happier doing his work in an imaginative organization--this was the decisive factor. We were able to achieve a very important recruiting effect through some very general image advertising.

Financial advertising is a very particular sort of thing and there isn't very much done in it and it isn't very effective and it is almost as dull gray-cardboard in its effect as some of the standard recruiting advertising. But again, we used the imaginative, colorful design concept to promote the financial aspects of the company. And what we did along with that was to begin to develop, as I indicated the other day, the Annual Report as a promotion piece and as a device for selling more than just the financial aspects of the company. We outraged and injured the financial group by telling them [this was not really straight-forward but a little rough]--"we conceive of the Report as really a capability brochure with a financial section as a dropout which can fall off the desk into the hands of the financial people while the presidents read the rest of it." We said it as a joke, but there was a good deal of truth in it. Now, concurrently with the advertising, with the posters, with the speeches, we began another project which, again, seemed to be rather off-beat. That was the development of a corporate history. This project originated with the chief executive officer who said, "I think we ought to have a history of the corporation. It will help to pull the organization together." Here again is the integrating effort; you will note that we fluctuate or alternate between the external and the internal;- Persuasion of the outside people and integration of the inside people; the pulling together of the division; minimizing the divisional labels and maximizing the corporate label. The corporate history was to aid in doing that and this is what happened. I think that Hopkins probably felt we would come up with something like a brochure and some of the other people thought we would come up with something like the comic book you saw the other day. Instead, we came up with a volume of 410 pages and 1200 illustrations. The book, DYNAMIC AMERICA, is a study of the development of the country [the U.S.A.] from an agrarian economy to a highly industrialized economy and then into a scientifically, technologically oriented economy. And along with that, we depicted the development of each of the product divisions of the corporation: The submarine; electric motor; the airplane; electronics; atomic energy; missiles and space vehicles. This was an extraordinary exercise in graphic design. I'm going to leave this copy with Dr. Schwalm for the library. It would be worthwhile, I should think, to study it as a professional exercise. It took us about 3 years to produce DYNAMIC AMERICA. It was regarded by many of the officers and members of the Board of Directors as a sort of boondogle --a way of perpetuating the jobs of the design and graphic people. But again, we had a sufficient authority in the organization to override this and be able to point out the benefits that would accrue from this particular project. One of the benefits was that we took the material that was in the book and began to make advertisements out of it. We would do an advertisement that made the contrast between the first telephone with the hand crank [produced by Stromberg-Carlson] right on to the very latest development in electronic communication. We would take a picture of early glider attempts made before the Wright Brothers, tell the complete story behind it and then show the very latest development of the Mach 2 fighting aircraft, the B-58, the first airplane to fly at twice the speed of sound. Or we would show designs of early submarines in which courageous pioneers died and describe elaborate experiments of a fantastic nature in which, for instance, it was proposed that oars be stuck through the sides of the submarine which then, presumably, was to be rowed from the inside, under the water. We wrote and pictured the history of the "Nautilus," the nuclear submarine which travelled three times around the world without refueling, with none of the problems of accommodation or of toxic poisoning or any of environmental aspects of the ordinary diesel-electric submarine or "pig-boat." We took these stories, these histories of scientific development and out of them, made advertisements that were extremely intriguing to the general public and to our customers and share owners. We got tremendously high readership in the readership surveys that we made; even more important we got tremendously high response from the areas in which we were interested:- The recruitment of high level personnel; impressing of the financial community with the live-wire characteristics of this hot, new outfit and the feedback from our huge giant competitors, the G. E., Westinghouse people who finally (in effect) said, --"Say, who are these guys?" For G. E., that was quite an admission because they were looking down from a very great height. You will note that what we were doing with DYNAMIC AMERICA and the advertising and the Annual Report was to take basic ideas and run them back and forth through the whole spectrum of the communication arts. Naturally, when I am talking today I am talking about a case history. I am examining the case history of a corporation from which you may not derive any immediately practical application to your current work. Here, However, there are being stated basic principles which you can apply to your organization in the schools, which can be of help in communication and organization management, and in the proliferation and merchandising of ideas. These principles are basic to the communication process. I would hope that you would derive from these case histories, basic principles and not find the detail too exacting. In our earlier discussion of the advertising business, I mentioned the "Man of Distinction," the Calvert promotion that moved vast numbers of cases of premium whiskey. It was expected that this idea would run about one year and generally in the whiskey business, ideas do last only about a year because they are vigorously merchandised. They are pushed in every possible medium--TV, radio, magazines, newspapers, bar promotions, table tent cards for restaurants, and in scores of other ways. At the end of the first year, the advertising manager in charge of Calvert said,--"Now, what shall we do to develop another idea?" But he was countermanded by the head of the division. W. W. Wachtel, who was known as the "gentleman" of the whiskey business--and he was--who said, "No, we've got a good idea, let's keep moving it along." While the "Man of Distinction" might have had a normal life of one year, it lasted some seven years. We come back again to what I commented on the other day:- In this business, the idea is all. The idea is the beginning; the idea is the all-important thing; and it is so because good ideas don't come too often and when you get hold of one, it must be merchandised, it must be exhausted, it must be utilized to the full. This is the economical way to do it. The DYNAMIC AMERICA idea, for example. In one of our Annual Reports we actually reproduced every one of the pages in this book. Here (showing Annual Report) we have some thumb-nail size prints --of course, you can't read anything but you can get a feeling of pattern and flow; you can see the evolution of the electric motor; you can see the development of the submarine; aircraft; and the missile. You can see the "era of wonderful nonsense" in which we discussed the speak-easy, reproduced John Held cartoons, showmen Babe Ruth and Jack Dempsey and at the same time, illustrating the development of an industrial organization in a particular social and economic environment. This feature of our Annual Report was regarded as a waste of money by many people, yet again we made a tremendous strike because we got back hundreds of letters from important people in industry and in science and in the government who said that this was the most unusual Annual Report that they had seen. Achievement of this sort doesn't mean a thing from the standpoint of personal credit. The questions are--Does the idea work? Is it effective? Does it produce what you want it to produce? Not--Who did it? As long as we are on Annual Reports, this (showing report) is another General Dynamic Annual Report in which the artist has pitted forces, dynamic influences against each other and produced a distinctive cover design. This particular Annual Report is quite elaborate--with some half-page pull-outs--we were talking the other day about pull-outs not being particularly productive in advertising. They were productive here because every one of them was at work; every one was esthetically pleasing; every one of them meant something. They were not there just to show how tricky we could be. Within the corporation some people said, "This is a colossal extravagance." On the outside, it not only received a tremendous amount of attention from the people that we wanted to get favorable attention from, but incidentally won the gold medal art director's award for the year in which it was presented; and along with it, four other awards for various phases of advertising and finally, the award of the art director's club of New York (perhaps the senior and most influential club in the country) to the President of the corporation for a "unique program of integrated design over the years which has served to promote the welfare and prosperity of General Dynamics Corporation and raised the standards of the communication art." Along with these programs--you see how we are moving back across the communication spectrum, taking an idea and merchandising it--this phonograph record with the unpromising title, "The Size and Nature of the Universe" on one side and "The Theory of Relativity" on the other side; both by Edward Teller. Dr. Teller, as you know, is often called the "father of the hydrogen bomb," a strange appellation. I can't reconcile fatherhood with the hydrogen bomb and he doesn't particularly like this sort of thing. Admiral Rickover is called the "father of the atomic submarine." This persistent desire of the press to label eminent persons as fathers of inanimate objects is rather an amusing aspect of the communication business, as is naming destructive hurricanes "Betsy" or "Helen"; or calling Communist China "she." Teller has a heavy Austrian accent and the first time, in the confines of the office, people heard Edward in his heavy Austrian accent, talking about the size and nature of the universe, they were very puzzled. They said, "This is nonsense! Why do you want to do this?" The creative people intuitively understood that here was a great opportunity to promote a basic idea and to promote it through a man who was getting reams and reams of national publicity and attention. Here was a national figure and we were able to use the attention-getting power and the prestige of the leader because Teller was the consultant to the corporation. We knew we had already tapped one of the jet streams of modern thought and action--the technological revolution, the atomic energy era--and here was one of its chief exponents; a man who, almost every day, was making startling and controversial and provocative statements, and who, in addition, was carrying the burden of being "the father of the hydrogen bomb." Teller and Oppenheimer, of course, had their differences; this was one of the notable conflicts of the technological age. Teller had the same sort of standing in the scientific community as Oppenheimer did, he was a genius and was known to be so by his associates; and this, again, served our recruiting purposes. In some of the tests we ran, neither the young people nor the older people wanted to get away from listening to Edward Teller describe the universe and explain relativity. It was astounding to us that they would sit out both sides of the record. This attention was a tribute to Teller's ability to communicate (once again I am talking about personalities because they tend to fix in our minds certain principles). Teller had the ability to explain anything; to make something very complicated seem very simple. This, of course, was the reason why he is such a tremendous teacher. He has taught hundreds of the chief scientists who now guide the destinies of this country along the technological frontier. For instance, one time we invited Teller to a directors' meeting --to the dinner that followed it--and asked him if he would do something unusual for us, if he would seek to explain atomic fusion, not atomic fission; fission was then outmoded, atomic fusion the hydrogen bomb principle was the scientific headliner. Teller said that of course he would be glad to do this. After dinner, de Hoffmann introduced him and Teller got up and began to talk about nuclear fussion and the development of the hydrogen bomb and the possible controlled development and use of the fourth state of matter, the plasma out of which one might be able to extract absolutely limitless amounts of energy, still the hope of the nuclear physicists. He talked for about forty minutes, with not a sound from the directors. When he was through, after the applause, I said to de Hoffmann, "Fred, this is just remarkable. I think I can understand for the first time what nuclear fusion is all about." De Hoffmann said, "This is an ability that Edward has. However, let me ask you a question about ten minutes from now. You'll find it has faded out of your mind. You won't be able to tell me what atomic fusion is." This wasn't Teller's fault. It is simply that one gets the illumination of the great communicator, of the great message. You do understand it and you do realize it, but because of your weak concentration, your weak retention of complex ideas, you find that it begins to slip from your grasp. Within minutes in some cases, or hours or days, the concept begins to fade. This is why repetition, redundancy--again and again and again--is an absolute essential element of the communication art. You can't get away from the necessity for redundancy, for saying it again and again. Great idea; great exposition; and say it again and again and again. One of the problems of exercising the principle of redundancy is that Boards of Directors and Executives say, "Why do we have to see the same ad again and again?" If we have the wife influence to contend with, the wife says, "I keep seeing this ad again and again in all the magazines and my friends say to me, "Can't you people think of anything else besides this one ad? We are so tired of seeing it." But these are insiders who are privileged to know something about the advertisement. They look for it; are sensitized to it; see it again and again. The ordinary audience to which you are appealing isn't going to see it again and again. These people have thousands of other ads to look at. In fact, if you put together all the issues of McCalls for a year and tried to go through them and read all the ads, you couldn't do it. You wouldn't have the time. It would take hours and hours, days, perhaps weeks--and that is only one of a dozen magazines you may regularly read. You must repeat again and again not only because if you have a fairly complicated message, it must sink in and its fading effect must be revived, but because it isn't going to be seen by everybody the first or the second or the third time around. It is only going to be caught fleetingly by some of your customers some of the time. So you must "shotgun" this approach, you must--again and again--repeat the message.

QUESTION: DYNAMIC AMERICA--what year did it come out? ANSWER: In 1960. It was in process for three years. The important point is that we didn't keep it in the vault for those years. As we began to develop the book, we would pull sections out of it and make advertisements and promotion pieces out of them. We used what material we had at the time we had it because it was interesting, unusual. We ransacked every file--not the files of the company (trivia compared to the other resources at our disposal). We ransacked every archive in this country and in Europe to get the pictures and the graphic material we needed. For instance, (showing section of DYNAMIC AMERICA) here is a whole section on the development of the electric launch which, I am sure, none of you have ever heard of. Back around the years 1890 to 1910, the electric powered launch was an extremely popular device. It was a feature of the World's Fair in 1893. The archaic quality of the picture--the electric launch in contrast to the electric powered submarine, gave us a natural interest, arousing a set of selling devices. In short, we bagan to use the book before it ever was a book. So 1960 was the year it appeared as a volume, but it had begun to appear in sections throughout various media long, long before that. As to the Teller record, we ran an ad, a corporate ad, really, saying that the record was available at $3.00 a copy to individuals and to institutions at a reduced rate. The reduced rate was no charge. We didn't say that at the time. Along with the record on the inside cover of the record cover, there is some continuity about Dr. Edward Teller and a statement of the General Dynamics corporate purpose: General Dynamics is the product not only of its own particular history, but of the scientific and industrial history of the western world and we declare our corporate purpose to be the comprehensive exploration of the basic forces of the universe. In that folder we also included as a little bonus, a star map; a map of the heavens prepared by the National Geographic Society. The ad ran only in the National Geographic. I believe we sold $12,000 or $15,000 worth of records to individuals and we distributed several thousand to educational institutions throughout the country. Teller's record became a kind of an "in" thing for a few months. His explanation of the size and nature of the universe and the theory of relativity seemed to be particularly interesting to the teenagers in physics and chemistry courses who had not really had an opportunity to hear anybody authoritative talk about the very subjects in which they were trying to make progress. This was certainly not visual communication, but it was hooked up to--an adjunct of--our total visual integrated design program. This was an audio intrusion that fitted perfectly. I didn't know until later that Teller had a reputation for being able to interest young people and for years had conducted an annual lecture of one or two nights in San Diego. One night and then a repeat, a follow-up night. He used the San Diego civic auditorium which was absolutely crammed with teenagers and this man, this great teacher, this great communicator was able to explain to get something across that lasted with these young people, something they didn't get in school. Teller's San Diego lectures for young scientists was the intelligent use of the authority, the man, the communicator who personifies knowledge. And Edward, of course, was an intensely individualistic person; a showman-scientist-genius. I mean the accent; the piercing black eyes; the very bushy eyebrows; the controversial statement; this man became a perfect image or symbol for the promotion of scientific, technological information. He was very gracious about the whole thing. There are many scientists who would run in horror from such a "communication" use of their talents; but he didn't. He loved to teach people and he did a miraculous job. We put him on the record and so he continues to teach. I have played this for young people, too, and have had them tell me, "Don't turn it off, don't turn it off. This is interesting." I couldn't really believe it, but they would listen to it as they listened to certain forms of modern folk music. This sort of promotion doesn't last forever, of course, but it is an indication of what you can do.

In the development of a broad-gauge communication program--in addition to exotic materials such as the advertisements, the records, the brochures, the comic books, the TV spots, the speeches, the history, the personal appearances, the essay-speech--there is the very earthy kind of ordinary stuff that you have got to turn out in support of a basic function of the corporation. You must never forget--your communicator must never forget that communication is a support function. It is a service function. In addition to the development of the various aspects of external and internal communication--the image, the industrial, the commercial, the financial, special promotion, and the annual report--there are those sales-support items which must be factored into the corporate communication program and more particularly, into the subsidiary and divisional communication and marketing programs. These direct mail; capability brochures; catalogs; sales promotion material; newsletters; film; tape; records; closed circuit TV; presentations and proposals; meetings; conventions; symposia; trade shows; exhibits; open houses; and design-engineering-inspections (DEI). These are tremendous profit opportunities, career opportunities for the young communicator. It is only when a communicator has arrived at a very advanced stage of development or is naturally an extremely skillful person with great flair that he can move rapidly into the development of the image advertising. The path is generally up through trade advertising and through the planning, designing, and writing of promotional material and brochures; the kind of booklets you see in automobile showrooms; the kind of book you pick up when you go to buy a refrigerator or a television set. Now, while this used to be frowned on as a relatively low-grade effort, now it is becoming increasingly important. And the same sort of genius, the same sort of flair, the same sort of design expertise that applies to some of the more glamourous aspects of national print and TV campaigns are being used to produce these booklets and promotion devices. I have in mind Volkswagen or Xerox. If you use these as examples or resource materials--if you will go in and you get what Volkswagen puts out in the way of sales literature, or Xerox, or some of the other more advanced people and see the quality of the artwork, the crisp concise writing and the excellence of art and reproduction, I think you will be astonished at the progress that has been made in the last few years. You might also be astonished at the variation that exists between these two leaders and some of the other people who apparently never look at what the competition is doing. You see the variation between leader, and run of the mill and the very poor practitioner of the communication art. I think we will need to say something further on to the effect that not all of the organizations to which your students are going to go will be in the forefront of the electronic technology. They certainly aren't. I would say that ninety percent of this country's commercial and industrial organizations are well behind advanced communication technology and that for your people there are still tremendous career opportunities in more conventional modes of expression than those described by McLuhan and others.

Throughout the whole spectrum of communication functions and activities--a continuing problem of the creative man (in addition to his problem of creating something, getting it out, getting it accepted and getting it distributed) is the basic problem of his differentness. Very often the creative man is different in philosophy and attitude and insight from his associates. Very often, then, we could say that the communication man is different because he must always be a creative person, even though he has an engineering or administration background. Some of you might consider the question of differentness as one of the intangibles that you ought to talk about. I don't know that you can demonstrate it; you can merely tell people about it; tell them how to recognize it and leave it up to experience to confirm for them what it is that you may know. The quality of differentness is a chasm, a communications void, or gap; the communicator must bridge it. And in addition to his skill as writer or typographer, or designer or engraver, the generalist, the man of multiple communication skills must be able to bridge the differentness between the communicator or the idea man, and the engineer, the administrator, the financial man. The idea man in communications and the administrator; the idea man in communications and the legal and the financial man. Do you recall the chart that we had up here which showed the president of the corporation and then his top staff which was made up of legal, financial, engineering, operations, and communication. Between and among these people there is a problem of communication This is the internal communication problem at the very top level. It exists probably because of the "chemistry" we were talking about, but essentially because of the differentness in the thinking of the creative man, his way of looking at the world, his way of patterning the world, his way of saying visual communication is important, visual communication is the way to move merchandise and to move people to action; this is what we see in visual communication and this is what we recommend to you. The legal man with his extraordinarily different training says, "I don't get that. I mean it doesn't have any logic in it. It doesn't even make sense. You haven't finished the paragraph. You haven't completed the sentence. You have a fragment here. It is not a logically ordered presentation. It is not a logically ordered piece of copy. The art is not logically ordered. It doesn't make a coherent system." And the communication man has got to explain to him that the completed sentence is not always desirable; the completed paragraph is not always the effective paragraph; the ordered, logical design is not always the design that moves people to action or to thought; and in fact, he might even get to the controversial statement that logic never sold anybody anything. This sort of differentness is inherent also in the financial man. This is the fellow of the facts and the figures; the man who develops the budget or who insists that you develop the budget. I have here the budget for General Dynamic's communication program for 1960; presented in the fall of 1959. You might keep this in mind if you are seeking to influence industry to contribute to your support:- All budgets are made up around October and decided on in November. If you aren't in there in September, you won't have a chance of getting into that budget. Here's a communication department's budget--category after category, page after page, table after table, figure after figure--the accounting man's symbology. These figures are extremely meaningful to him and, of course, they are to us in the communication business when we get right down to translating them into the invisible little diagrams and symbols that say what it is we are doing. This is the financial man's training and mentality; and he is thinking in these terms. He is thinking in the terms of the center portion of the Annual Report, the tables and graphs and charts, the statistics and we are thinking in terms of the unethically brilliant and colorful stuff. But we must communicate with these internal staff members, we must communicate with the legal man, we must communicate with the financial man. We have to be in rapport with the operations man and the engineering people. Internal communication starts from the human side, the biological side, man-to-man. How do you recognize the gap and what do you do about the gap? The legal man, the financial man, the engineering man all may have within their own disciplines extremely interesting and original ideas. They may be real idea men. Of course, there are--particularly in the engineering group--real idea men in operations and administration; and real idea men in legal and finance but, interestingly enough, they don't seem to recognize that the idea function can exist also in communications. We have here a question status within commerce and industry. As probably everyone knows, in the early years of this country, being a lawyer was somewhat equivalent to being dog catcher. If you were a lawyer, you were probably a shyster. The legal profession overcame this--Yet, this selective blindness is not true, I think, of the communication man. He can recognize the idea man in that engineer, the lawyer, that financier. It seems to me that the burden of crossing the bridge, of bridging the gap, of making the contact, of extending the palm of peace, falls on the communicator because communication is his business. He may be a fine writer, but there are fine engineering writers. He may be a sound graphics man, but there are good graphics men in engineering. He may have an understanding of languages, of mathematics, of symbology, of logic, but there are such linguists among operations people also. The distinction is that the communication man has a facility, a skill, a natural inherent interest in communicating--whatever the medium--a need to communicate that transcends all else, so it is up to him, it is his duty, it is his business to bridge, to bring together. I think you must tell your people that this obligation must be one of the indispensable intangibles that you are teaching in your courses. The generalists--if you are teaching a man a spectrum of communication skills--has to understand who he is; and what his obligations are. If he is going to be in industry, he must be the initiator, he must bridge the gap, extend the hand; and, of course, he is going to get the hand slapped down hard. The hand of friendship often gets knocked down. The open gesture of welcome frequently invites a clip on the jaw. Business people are rough, not because they are sadistic but because like pro-football, the game is rough. This is the game they like to play; and they enjoy hitting and being hit. You must tell your sensitive communicator that he must not shrink from the conflict. We got a little bit away from internal communication. We ought now to move into it because it is such an extraordinarily important part of corporate activity. We have covered internal communication somewhat in discussing the uses of the chief executive of the corporation, and in the development of contrived events and the employment of natural events to serve our purposes. If we go into too great detail, I fear that we will go beyond what may be applicable to your particular needs. It seems to me that a great many people don't really understand what internal communication is. Internal communication begins with the man at the top and his communication with his staff; it begins with the communication between staff members; it begins with the communication between staff members and their opposites in the divisions. I have mentioned that the success of General Dynamics was, in some measure, the result of a sustained seven-year promotional effort in which every power of communication was used to build the image of the corporation. The sales and profits charts just kept moving up. See what happened suddenly, at this peak of success, was due to a number of factors. I don't think that any analyst can say that he knows exactly what the causes were. One of the principal causes, however, was certainly what I should call a failure of internal communication. This is a theory of mine; it may not be correct; I don't mean to advance it as the final solution. I suggest, only as a possibility, that this was the failure of headquarters to understand that autonomy or complete decentralization is not a feasible way of life for a complex, multi-division corporation. The history of corporations in the United States has been characterized by--in the big ones--decentralization on a "can't help it" basis. When one of these large corporations acquired new divisions or new subsidiaries, it was almost impossible to get the necessary data into the central office in time for the central office to make decisions and get them back to the divisions. Therefore, the division manager had to have a certain degree of autonomy not because the central management wanted him to be, and not because this was really the most efficient way in theory to do it, but simply because it was the only way effective action could be taken. In the case of General Motors, it is my theory that they recognized this very clearly at the divisions. Buick, Oldsmobile, Chevrolet, and the rest of them became strong, autonomous organizations; on top of them was a central management concerned principally with financial policy and basically sound operating procedures. Divisions were autonomous and were encouraged to be autonomous because there was nothing the top management could do to centralize effective control. What happened--and General Motors was extremely shrewd in this, I think, looking at it from the outsiders point of view--was that top management said to their division managers, "If you are a successful manager, if you are a great operator, you can make a million. Do you want to be a millionaire?" This is a hard question to say "no" to. A lot of them did want to be millionaires and so they were willing to devote the extraordinary effort required to get on top of a big operating division and to make it pay out. In addition to making them millionaires, General Motors, I think, took these operating managers and gradually moved them up into positions where they became members of committees--financial, executive, management--at the top of the operating group in the company. There they got integrated into the top operations. Held there by money-making motives, they began to learn how a large corporation is operated. At GE, the divisions were extremely autonomous; many of them not because the company wanted to have them so, but because of the necessity that I talked of and also because of a parochial feeling of statehood. This attitude was expressed by individuals who, when they came into headquarters at 570 Lexington Avenue, dared to say to the chief operating people, "Well, today I'm visiting the overhead." This sort of daring, of course, goes beyond joking toward impudence and is not taken too well by the top executives. There is a classic tale told about the GE lamp divisions that indicates the degree of autonomy the independent operator can develop. Now, General Electric never, any more than any other large corporation, sought to publicize the sales and earnings records of its divisions. [Financial editors are always trying to find out--what this division makes and what did that division make, because then they can get a fix on which division is the profit maker and which are the profit losers in the company. Then they have material for news stories and articles. There are also other uses for this information. So the large companies don't like to give out division figures and most of them will not.] The principal profit maker in the General Electric Company for many years was the Lamp Division. The Lamp Division produced for a rapid turnover consumer item market--on which they had a very good grip. The Lamp Division steadily produced fine products over a great many years, supporting other divisions of the company which may have had feast and famine stages. One year the Board of Directors decided, as a very enlightened procedure, that they would [as many other companies have since done] hold their annual meeting at the Lamp Division. They notified the manager of the Lamp Division that they would be there, say on April 15 or May 15. All the notices were sent out and the board members came from different parts of the country--from huge banking institutions, from the investment banking houses, and from other large corporations. They got off their trains, and they took their limousines and taxicabs and private cars and they converged on the Lamp Division. When they got there, the big, iron gate was chained and locked and the sign said, "Plant Closed Today." The obstreperous, individualistic, reactionary, "I-am-my-own-boss" manager of the works didn't want the Board of Directors to meet there; he didn't want them butting into his business; he didn't want to have anything to do with them; and he was telling them in a blunt gesture who was the profit maker in the company and if they wanted to have their meeting they could have it some where else. And so they did. But to the credit of the Board of Directors, the GE Lamp Division rapidly acquired a new manager. This may be merely a pleasant myth, but it has persisted at General Electric as an example of what happens when autonomy is carried too far. Our friend Boulware, whom we have mentioned before, used to refer to them as the robber barons, fellows who would come in and put their feet on your desk and spit tobacco juice on your floor. Sounds crazy, but it isn't. This is what happens when autonomy is granted.

Now the problem of communication is becoming much more interesting simply because of the new facilities that are offered in data transmission, data analysis, data storage, retrieval and dissemination. What is happening here, it seems to me, is the beginning of the recentralization of American business. The forces at work here are centripetal in effect--putting control of the business organization back into the central headquarters office. Electronic data handling, computation, and logical decision making have made generalized communication coordination and control feasible. And the mistake that General Dynamics made, I believe---and again it is only a theory--is that they watched General Electric very closely and listened to the stories about the decentralization and they said to themselves, "Decentralization is good. This is like a democracy. We decentralize; we give people authority; we let them grow by themselves. If they do something wrong and we find out it is wrong, we will correct it." In my opinion, General Electric wasn't decentralizing voluntarily, they didn't think it was great, and because they couldn't help themselves they simply said, for public consumption, "Decentralization is democratic." Every single effort of every one of those executives with whom I was in contact over a five year period was to intensify and screw down and tighten up the lines of communication and control that connected the central thinking organization, the central concept organization, the central policy-making organization with these various divisions and subsidiaries. For instance, it was interesting, indeed, to be told in publications throughout the country of the great decentralization at GE, when I know perfectly well that the office of the vice-president-employee-relations sent its own men into Plant A, Plant B, Plant C, and Plant D. Throughout the whole management structure there were men trained by the central office and put into local offices. These men reported to the general manager of the division or the plant but reported also to the place where they had been trained, from whence they came, and with which they were in constant contact. So don't believe everything you hear about decentralization, about communication; don't believe everything you read in magazines; or hear from lecturers. The question comes right back to:- How are organizations controlled? My theory is organizations are not controlled by democratic processes, they are controlled by the same sort of centralization of communication decision-making by which any complex, biological organization is controlled. The same way--talking in biological terms--as the brain controls the body. Of course, there is a lot of decentralization in the sense that you have nervous systems that operate automatically and reflexes that don't require thought. The heart pumps on regardless of what the brain is occupied with at the moment. But back up here at the top, is where everything is really in control. This is where the policy is made; this is where the important decisions are made; and then this body is told what to do. I don't see too much of a difference between the biological model and the corporation. So General Dynamics, I feel, possibly made the [I keep qualifying this because there isn't any absolute truth about anything. Let's say that I advance my impression, or expression, concerning this company]--at GE they became convinced that decentralization was actually a good thing; whereas, GE said, on the surface, "Yes, great; wonderful; we're all for democracy," and on the inside said, "How can we more tightly centralize this thing? How can we keep control so that there is a central corporate entity, image, direction, destination?" That's what GE was doing while the GD people were saying, "You bet. We will decentralize." And they did. In consequence, they did not have the necessary constant, incessant, radar monitoring of every single indicator, every single bit of data. Almost (in some sort of intuitive sense) everything that was happening in the complexes was felt sentively at GE as fast as it happened--at GD it wasn't. This meant that there were time lags between event and information-about-event; reception-of-information-about-the-event; deliberation about the information; decision about the information; return transmission of information; debate and deliberation on "do we obey this order; or don't we, or can we get away with it? And decision to act. We have seven or eight or nine communication processes occupying great amounts of time. What tends to happen here is that the decision gets made within a time lag that may be anywhere from 60 to 90 days after the actual event has occurred. The information ought to have been acted on within a day, or two days, a week at the most. There was a 60 to 90 day time lag. And this meant, I feel, that the heads of this corporation didn't know what was going on; and the action they took was not pertinent to the situation. The situation had existed; by the time a decision was made pertinent to that situation, another situation had come into being, replacing the situation that was being acted on--as if it still existed. Therefore, the decision made dealt with fantasy, a fiction; a no longer existing situation. The time lag was sufficient to permit vast expenditures and vast engineering changes that tended to multiply, to pyramid, to add on to each other to the point where literally the corporation was not under control. Certain aspects of this problem were covered in the FORTUNE articles I mentioned to you. In this sense, they did a good reporting job.

Now we have discussed the high level aspects of communication--in this particular case a very dramatic instance of where the organization, the organism went wrong, just as though a nerve impulse had been cut off from the fingers. Now in the internal communication process, the general reference is to three-way communications, up, down, and sideways. And, of course, there are many other channels of communication. I don't see them as lines of force like this (on the chart) but simply as radar pulses--a far better and a far more modern concept. In the internal communication function of a company, you have communication between the high level staff members, you have communication between the divisions, you have general communication flows up, down, and sideways in the bulk or body of the organization. These internal communication flows are divided first, into a formal system of communication (the three-way communication using all media); the use of signs, symbols, graphics and surveys, for feedback. Second, there is an informal system of communication:- The grapevine and the informal leader. The informal leader is an extremely important person, as many of you know. There is, third, the identity system in which all media and graphics are used. Integrated design, nomenclature and symbol, and a style manual are developed. Fourth, are internal media systems:- Publications, information services, newspapers, magazines, newsletters, handbooks, mailing lists, graphics, editorials, photofilms, computer sections, tape, film, video microfilm, technical libraries, exhibits, open houses, rumor clinics, management schools, historical collections in museums, and finally and probably the most important part of--in modern terms--the internal communications system--research or feedback. You get feedback through the customer, from the customer, among and between the employees, and to and from the shareowners. Now this material I would like to discuss in considerable detail tomorrow, if I may, using the GE as an example. Again, we will be looking back at something in time past: Events fixed, perhaps, in amber. Yet long gone as it is, it is a case history that still has relevance to today's organization and communication problems. As I pointed out before, the corporations or companies that are using all-modern, all-electronic, all-advanced psychological concepts of communication are still few in number. There are going to be a great number of companies in 1966-1970 using the communication techniques developed by pioneers like GE back in 1955 and 1960. So what I would like to discuss tomorrow are the two phases of General Electric's internal employee communication program. One is called "Programs" and the other is called "The G. E. News." Probably the most important will be the subject of communication programs. These are split into three areas:- Motivating the management team; developing supervisors as leaders; and building confidence in management. The programs, the discoveries, the techniques and the methods that a corporation such as General Electric uses offer tangible, specific techniques that you can apply in getting solutions to problems that lie before you now and will confront you in the next few years. I will conclude tomorrow with internal communication.

## LECTURE 5

In our first lecture I said that I would not discuss books on communication. There are, however, several that I would recommend. One of these books--I first read it many years ago and it still seems to me a classic in the study of the creative imagination--is THE ROAD TO XANADU by John Livingston Lowes. This is a very detailed analysis of the development of the creative imagination of Coleridge, the poet. It sounds on the surface, perhaps, a little bit dry but the point here is that Lowes set about to read everything that Coleridge had read and written, including all of his notebooks. Then, taking the notebooks as his chief source, he tracked down every comment that Coleridge had made about any of these books, examining the source material and making his conclusions. THE ROAD TO XANADU refers to Coleridge's vivid, compressed poem "Kubla Khan." Lowes was trying to discover what happened in Coleridge's imagination that enabled him to produce--under the influence of opium, the then current LSD--a sudden, vivid, clearly visualized poem which he immediately wrote down after he had awakened from his trance. Unfortunately, in the middle of the writing--he had visualized some 300 lines of the poem--there was a knocking at the door. When he went to the door, there stood a tradesman from some nearby town who had a bill to present. After Coleridge had debated the bill with him and, I suppose, finally reluctantly paid it and the fellow had gone away, he went back and sat down to write again--but that was the end of the vision. Coleridge could not recapture the rest of the 300 lines. So I think one may ask the question, "By what process were all these images stored? By What process were they transmitted into a new work of imagination? And what happened when the process was interrupted?" One might draw a further thought from this that sometimes in the pursuit of the ordinary, of business affairs, we lose the vision--and we aren't going to get it back. I think this again goes back to the comment made the other day that when the idea comes to you; when the idea calls to you, you must obey it and you must fulfill it--otherwise you may very well lose it, not to be regained. In essence, what Lowes discovered--and this since then has been confirmed by intensive psychological research--is that there must be a very powerful storing of the mind. All sorts of images, impressions, readings, contacts with people are part of the creative man's environment and are brought into the mind and stored in the recesses of the mind--Lowes calls it "the deep well" of the mind--and then some curious process of transformation begins. This transformation took place in Keats, too. If you observe, watch Keats and trace his early work you will find that for a number of years he was writing clap-trap, junk, tripe--you might say--ordinary, conventional stuff, imitations of other poets and very poor imitations, too. Then suddenly, in one brief period of his life--one year--he went from this "classical" nonsense into such things as "Ode to a Grecian Urn," "On First Looking into Chapman's Homer" --superb examples of the creative art. Anyhow, I think you would find THE ROAD TO XANADU as fascinating as a mystery story and particularly important in its depiction of the creative technique. In a book by E. T. Bell, MEN OF MATHEMATICS, you may find of particular interest the chapter on the French mathematician, Henri Poincare, in which Poincare describes precisely the process of the creative imagination, insofar as he is concerned. Poincare was known, I believe, as "the last universalist," the man who had a complete grasp of all phases of mathematics; who originated new ideas in great profusion, which burst onto the world, one after another, to the astonishment of his confreres.

Poincare's depiction of how the creative process works is exactly parallel to Lowes' description of the creative events that happened to Coleridge and other creative literary people. Each one says you must work very hard; you must store the mind; you must cram everything you can into the mind; then you don't do anything with it. You simply wait. Well, this may take a little nerve in the industrial system, but you wait according to Poincare, and "suddenly," he says in describing some of his most important discoveries, "one day I was getting on a bus and as I put my foot on the first step, the idea came to me and I rushed to the back of the bus and sat down and wrote out all the equations," which turned out to be a book this thick, Or, "I was sitting at the table one day thinking about nothing in particular and suddenly I had the solution of a problem which had been puzzling me for months." Recently there was an interview of Linus Pauling and Edward Teller and I think one other fellow whom I can't remember, all three Nobel Prize winners and the question was, "What do you do when you run into a very difficult problem?" And their answer was--"We don't worry about it." And the interviewer, of course, thought that any Nobel Prize winner should really worry about a problem. He had the idea many people have that logical processes of thought result in scientific discoveries, or in creative acts of imagination. This is not true, according to them. Logical processes of thought result in logical definitions and analyses and conclusions regarding something that has already been discovered; but the new discovery, the solution of a very difficult problem, is --according to these three men--a storing of the mind, and working very hard on the problem and butting your head against the bafflement or blocking of a non-solution and at that point--this, of course, is a major problem--you don't do anything further with it. You put it aside and then when you are shaving some morning two weeks later suddenly (always "suddenly") the solution come to you. Then you must drop the razor, foam on face, and all --run and put down the idea, because if you stand looking in the mirror and saying, "How wonderful I am" you will never conclude the thought. A difficult problem is solved by revelation. Perhaps many of you may not agree with this, but I assure you that if you check the creative people you will find that no one really knows where basic ideas come from. Logical engineering extrapulations from basic ideas are easily understood; but where does the idea come from, and whose is it? It certainly isn't yours. "I have a great idea," is the wrong way to go about explaining what is happening in the creative process. "A great idea has come to me," might be a better, a more accurate way of describing what has happened. Breakthrough ideas, great ideas are really the result of very hard work and the "sudden" flash of inspiration that comes from you don't know where. An interesting commentary on this, of course, is if you look at the history of inventions, you will find that great inventions seem to take place in distant parts of the world almost at the same time by different men who have never had any contact with each other. You can check back in the papers and find that they have been working along the same lines toward the same general objective without the interplay of communication and "all of a sudden" both arrive at it. This is one of the mysteries of the higher levels of communication which are perhaps beyond the scope of our sessions here, but which one should think about. So I think Bell's study of the creative process in mathematics is extremely pertinent. Also, Barnard, to whom I have referred before, the man sees the president of the corporation as the chief communicator, the chief organizer, and all the rest of the organization as the communication net. Read Barnard's book THE FUNCTIONS OF THE EXECUTIVE and also his second book ORGANIZATION AND MANAGEMENT. Sir Herbert Read's HISTORY OF MODERN PAINTING is an extremely imaginative study in modern painting making very clear what most of us don't realize, perhaps, that painters also are thinkers. Which goes back to one of our original comments during this session--or original conclusions--that communicators must initially be thinkers; that it all starts in the mind. I note that you have here in your library a complete set of the material put out by Gyorgy Kepes--LANGUAGE OF VISION, NEW LANDSCAPE, and others which are quite brilliant interpretations of the development of visual communication. And another one is Heisenberg's PHYSICS AND PHILOSOPHY. This is pretty nearly as interesting a THE ROAD TO XANADU. It is a discussion of the development of the quantum theory and of the creative imagination. The modern quantum theory and the development of it is creative physics pioneered by Einstein who, in his early days was dismissed contemptuously by his contemporaries as "not a physicist"; "not a scientist"; "he is a creative mathematician." Simply sort of a creative writer, I suppose. Well, this shows you how misunderstood the pioneer in a field can be; and how the whole body of the profession in which he is working will swing around later and follow him after they have "beat-up on him." Eisenstein's "Film Form and Film Sense" --a standard work you may have--is a very imaginative depiction of the use of the motion picture frame as an "intruding" device through which you can examine life as well as you can through a microscope. And finally, the one that seems to me to be particularly relevant--yet may not appear to be directly connected--Traven. An ambiguous novelist occasionally publicized by Life Magazine because they can't find out who he is or where he is. Traven may be his name or it may not be his name; he may exist or he may not exist; in any event, he exists in his writing and he has written two important books, I think. One called THE DEATH SHIP is not really the one I want to speak about. The other lesser known book is THE BRIDGE IN THE JUNGLE. THE BRIDGE IN THE JUNGLE is a study of the human heart and the emotions. I should like to remind you of my previous comment that the mind, the heart, and the hand are the essential tools of the communicator. Now, that is all I have to say about books. There are millions of others, of course, that you find out about yourselves. If you haven't discovered these that I have mentioned, any one of them might be a worthwhile adventure.

We have said that the development of the communication program in fairly large corporations involves an eight-phase effort. These, as you will recall, are: Reconaissance; problem analysis and recommendation; strategy and tactics; cost estimates; action; feedback; review; and recycle. In developing any sort of a communication program in industry, generally one must ask immediately, "What is the nature of the problem?" The problem may be one of general, overall, encompassing nature; or it may be one of a very specific, minor consideration. If we are talking about the general program as a whole, we must ask what are the present objectives of this particular organization, company (or even department) in respect of corporate, division, and subsidiary structure, function and destination. In respect of research, engineering, manufacturing, marketing, finance, and communication. On the chart we had up on the board the other day, you will recall, these were listed as the functions of the chief executive's top executive staff. These are policy functions connected directly to the operating functions of the organization. But what, specifically, are the objectives of each of these particular blocks--research, engineering, manufacturing, marketing, finance, and communication. What is the function? What is the destination? What is the purpose? What do you intend to do? And as you begin to ask these questions, you find out that what the vice-president in charge of engineering has in mind for the company is quite different from what the manufacturing man thinks that the engineering man has in mind for the company and quite different from what he himself thinks. Vice-presidents of marketing and finance also may have very different concepts of what the corporation is; what it means; what its purpose is; what the destination is; and what is the best way of arriving at each of the various events along the way to the destination. We assume the destination --in general--to be that of growth in profitability. Of course, one can grow in sales and become inflated from a sales standpoint, but find that the profits are diminishing because business is not attained on a profitable basis. One area where there may not be a definitive statement as to destination may be in the communication function. But there again, we may find that this group has definite ideas that are not in accord with those of other members of the group. And, of course, most disconcerting of all, the head of the corporation may say, "I know what, precisely, this corporation is; after all, I founded it; I know precisely where it is going; and I am sure that every one of my executives agrees with me." And so they do, in the board meeting--"yes sir"; "you bet"; "right!" The word right is a "good" communication word. It is a little bit better than "OK" which is all right for common conversation, but doesn't really have the hearty affirmation that "right!" does. For example: "What do you think? Am I doing the correct thing? "Right!" --very heartening. Many chief executives like to hear the word "right!" The trouble is, "right" is often wrong. It is only the communication man, the outside consultant who--clad in his armor of "you can't fire me; I have no pension benefits coming" --can walk in and say, "Did you fellows know you are doing such and such?" And they say, "No--what do you mean?" And the consultant says, "Your practices are contradictory; you are defeating yourselves." Then the management group wants to know in what way; so you go into very great detail and you can see them, some of them, thinking--"How can we get this guy fired? How can we get rid of this nuisance? If we let him stay here very long, he is going to upset everything." But the top people who asked the consultant to come in know better than this; and even though it causes them suffering, they endure it. The communication man coming in from the outside--the corporate communication man who has a strong enough staff so that he really knows what he is doing in a professional way--is going to find out these things. And he is going to point them out to the chief executive and say, "You must begin to integrate before you lay down your basic policies. You have got to determine your three year, five year, and ten year objectives.

Boulware used to say, "If any of you fellows want to leave me and go out and get a job in employee relations, the first thing that you say to the man after he has interviewed you and there is a silence across the table, you say to him suddenly--'By the way, what is your employee relations policy?' And he won't know; so you say, 'Do you have a job description of this position that you want filled?' And he won't know that either; so this is your opportunity to tell him, to sell yourself, and to write your own job description and fill your job."

When the consultant asks the executive, "What are your basic objectives?" --He will panic for a moment and run his mind back and forth and then say, "To make a profit, of course." One can't argue with this, "to make a profit." But if you say, "What specifically are your three year objectives?" This will make him a little bit uncomfortable. I am not talking about some of the more sophisticated, top-level people who have thought all this out--although in one stage of their development they, too, were in this phase. There are, however, many, many corporations now of considerable size that still do not know what their three year objectives are or if they do know, can't or won't state them let alone the five year or the ten year objectives. We created sort of a furor in Dynamics one time by saying at a Board of Management meeting--"We ought to think about the 100-year objectives of the company." This pretty nearly terminated the entire relationship. Actually, emotionally these fellows didn't want to think about the 100-year objectives because they knew that physically they weren't going to be there. Yet, the corporation probably will be there. I am sure that people like IBM and even our suffering General Motors, Dupont, and others do have this excessively long-range view. This means, of course, the integration of the corporation into the socio-economic phase of its existence. Many corporations of small size don't think broadly in terms of economic structure and function; but companies like GM, IBM, and Dupont and many of the five hundred largest listed in Fortune magazine do, and must think about it. They must think beyond the life of the present staff; beyond the life of the present executive group or even the middle management group.

The next question is, "What is the nature, size, scope, and cost of the present communication program?" One can look at a budget book and get some of this, but even if you look at the figures you don't really find what are the "intent" and "content" --to get back to some of our key words--of the communication program. "What is the external program? What is the internal program? How effective has it been? How do you assess it? How effective is it in support of sales? How effective in support of public relations program and the promotion of the corporate image?" If you address these questions to each of the five or six functions basic to management, you then get a multiplicity of answers; and you will find that many of them are greatly at variance. What kind of a communication program--nature, scope, size, and cost--will most effectively support corporate, division, and subsidiary aims--short term and long term? As you see, now the problem is becoming complex; we are getting many variables and many differences that must be reconciled. What are the specifics of such a program? We have discussed some of the specifics of such a program and have run through the general functions of external communications and financial relations with some mention of public relations. I wonder, however, if it might be possible to take an actual case history--and this is rather solid stuff--but I think with the background we have now, you might follow along without too much trouble. Let's take an actual case history of a company to which these questions were addressed. A company which had not had a very effective communication program externally; had had a non-existent program, internally; and whose various divisions had different concepts of where the corporation was going. Let's say--in reading these over and discussing this--if you wish, we will be able to run through the elements of an effective external communication program. We will begin to indicate the elements of an internal communication program. Then in the latter part of our session this morning, perhaps we can go into the specific case history of how General Electric approached an internal communication program with a three or four step program that actually and specifically obtained the objectives which they sought.

The document I am looking at is a 50-page recommendation to a large company which had established a solid reputation for the manufacturing of industrial boilers and who recently has begun to convert to the nuclear power program. This company was a pioneer and one of the biggest in the field. It was made up of real iron-fisted fellows who had come up the hard way in a coal and iron technology and were really direct, "no-nonsense" guys. They were beginning, however, to move into the era of nuclear energy and into an era of advanced technology; and they were beginning to get a little nervous. They were in a strange neighborhood. They no longer knew all the kids up and down the street; and had begun to suspect that some of these new fellows they had run into were considerably brighter than they were. They needed then to redesign their internal-external communication program and also to begin to adapt themselves to the nuclear technology in contrast to the previous coal and iron technology. I will read you my recommendations to them. "Number one, in external advertising, eliminate readership ratings as a factor influencing the design, continuity, and placement of advertising campaigns." We discussed this briefly the other day. My feeling is that readership surveys tend to intimidate people, tend to put an artificial set of standards and block off real creative people because the management runs in and says, "I've got the latest readership survey and it shows that your ad wasn't very effective. X percent saw it, and Y percent read part of it, Z percent read most of it, and forty-two percent didn't read it at all. But the communication man may intuitively know what readership is significant. He may care nothing about the forty-two percent that didn't read the advertisement; and would just as soon throw that segment out the window. The creative man may be interested, really, only in the eight percent of decision makers and pattern influencers or actual customers who wanted to buy. I would rather trust the communication man's intuitive understanding of what the people are like and what the creative process is than the readership ratings. "Draw a large black 'X' through everything that has been done and start out again in a new direction." This is where you may be wise to go into the storm cellar, temporarily anyhow, because many members of management don't like large black grease pencil "X"; it upsets too many things. Yet on the other hand, like surgery, this procedure may be absolutely essential to the welfare and health of the organization. In this particular type of organization which was moving into a new environment, to say "throw it all out the window" had a deliberate provocative intent. What was said in effect was, "You may reach out and pull some back later on, but begin to throw it out and start in a new direction. Direct the advertising agencies to use the realism of the various forms of still and film photography or combinations of these forms and techniques as the major media. Use art, but art in the form or sense of collage; architecture; design; models or sets; as opposed to art work, blueprints, water-colored draftsman sketches, and pictures of art. The company insisted, in its advertising or communication media, on using engineering blueprints or engineering and architectural drawings which had been water colored. There wasn't any solid impact. There wasn't any feeling of realism. There wasn't any feeling that this was actual hardware. There wasn't any really creative use of photography:- Making the camera move in and out of the product, up and around and through, and beside the product--so that one could actually get from the camera, from the photograph a real feel of what the product was--and this, of course, enables the copywriter to write about it feelingly, in vivid terms. This recommendation said, "Get rid of all of the diluted, gray stuff and all the conventional stuff you have been using and let's begin to use the modern techniques of imagery. Direct the advertising agency to use only top art directors or to employ as a consultant a top European or Japanese trained designer on all corporate and division accounts." We touched on this the other day and the reason for this is, of course, the intrusion of the outside point of view; the vivid, well-trained technique of the Swiss or German or Japanese art director. This again, in order to establish a new image, to break up old patterns of thought. "By executive order, make it mandatory that in all divisions and the subsidiary, the emphasis on print symbol, logotype identification of the corporation be equal. In other words, no one division takes precedence over the other divisions. The reasons for insistence on photographic realism with respect to products or product use, are evident in the deficiency of current corporate advertising:- The old-fashioned look of being locked into a coal-and-iron-technology--and this was incompatible with their intent to take off in new directions in the nuclear power field. Employees, customers, and the financial community cannot be convinced of a new corporate philosophy, new corporate leadership and a new corporate direction by the use of old, long-past visual and typographic forms. One can't really talk about how "we are pioneering the field of nuclear energy" when the typeface and the layout and the illustration say, "This isn't true." The recommendation continues:- "Begin now--on the basis of the chief executive's recent definition of corporate goals--the planning of corporate-wide integration and coordination of communication policy, strategy, and tactics for the one year, five year, and ten year periods. Translate the chief executive's statement on corporate directions into specific communication sub-objectives for each corporate service and each corporate operating division and its departments and each subsidiary company. In conjunction with the marketing function of each corporate division and subsidiary, write an overall corporate plan covering short-range and long-range joint marketing sales and communication objectives for the corporation. Define in specific terms the role, scope, responsibility, and results expected of image, institutional, corporate identity advertising in attaining general corporate objectives in specific corporate division and subsidiary sub-objectives. Develop a master budget." This is a one-sentence, gigantic task. To this--these recommendations--I appended a note on image advertising media with particular attention to the selection of Fortune magazine:- "If the assumption is that a company is placing its advertising in Fortune because it is cheaper to use this one management medium rather than a combination of Business Week, Scientific American, and Newsweek, I would agree that is--in dollars. Actually, it might be waste of corporate funds. To settle for Fortune magazine is neither scientific nor economical media selection. Even more important, from a money standpoint, it is not a creative procedure. Buying media is a relatively simple matter of computer arithmetic; using media is more complicated." The discussion of Fortune magazine and its use as a medium is very pertinent to some of your communication problems. I would ask you to take from these case histories, to take some of these principles, and begin to think about them and apply them to your own purposes, your own problems of communication. In addition, I should like to continue the theme of our conversation--that is, to tell you what goes on in large corporations.

To continue with the comment on *Fortune*, "I would recommend a shrewd analysis of national media as a special project for the largest of the agencies. Thoroughly analyzed should be the proposition that readers of *Fortune* do not read *Fortune* advertising." This general proposition seemed to be valid to me: If the readers of *Fortune* magazine do not read *Fortune* advertising--if this were true, then the corporation was wasting its money. I don't know how this would apply to other media, but it might be a general principle to examine whether--the medium itself presumably is the carrier of the advertising message which is influential in sales--whether there isn't a dicaotomy here--a split--in which the reader reads the content of the magazine and he may flip the ads; and perhaps the magazine has exalted the amount of carry-over there is between editorial readership and advertising readership. I suspect that this is so and I must say the reason may be that *Fortune* readership has trained itself to bypass the advertising--so much of which is dull, sterile, pompous and pretentious--and to read only the articles so many of which are intelligent, imaginative, provocative [and, of course, so many of which are misleading]. However, the point I think that I was trying to impress on these people is that the editing of *Fortune* magazine was done in a much more adroit and intelligent fashion than the editing of the advertising they had placed in the magazine. Again, we have the same sort of thing we were talking about the other day with respect to television. We are looking at a program which may be of extremely high level--requiring a good deal of intelligence or a great deal of interest, but not in terms of boobism--and at the commercial, we drop from this into the "dada, mama, papa, see, look" type of grunt-level communication which is distressing not only because it is ugly, but because it doesn't produce from the audience as much as it might produce. It seems to me that here is the curious case of the magazine which makes a substantial editorial contribution but whose promoters have sold it as a prestige publication and whose advertisers respond in a false, pompous manner. In consequence, I suspect, the readers who are the leaders and the decision makers, decision influencers and buyers, the readers that this particular company or any other company wants to interest are reading the editorial, but not the advertising pages--except for their own company's advertisements. Of course, you say to an executive--"Do you read *Fortune*?" and he says, "Sure, I read *Fortune*." "What do you read in it?" "Well, I saw the article about the new electronics managers and the development of the new, very bright, scientist-businessmen. I read the company's ad, of course. Maybe I read the article on the market economy and what is happening in West Germany and Japan." But this limitation of readership, reading your own ads doesn't do anything for the other fellow and he isn't getting anything out of it. If "X" company is trying to interest the president of "Y" company in what they are doing, and the "Y" president reads only "Y" advertising and you get zero in "X" company as your grade in that particular effort. My conviction is that most *Fortune* advertising is addressed to readers who don't exist. If your company were to advertise in *Fortune* and get the *Fortune* readers who do exist--that is those who read the editorial matter in the magazine--to put themselves under the influence of corporate and subsidiary selling techniques, the company will have to commit itself and its advertising agency to the same kind of intensive research, planning, creative art direction and writing that *Fortune* spends on its articles. Now, I don't hold *Fortune* up as being the greatest thing that ever came down the publication pike, but on the other hand it occasionally--in fact, frequently--has some extremely stimulating articles, stimulating art and communication techniques. To continue the written comment on Fortune:- "One of the basic costs of cracking this shell of pretention in order to get the real readers and buyers is this:- It may be some time before Fortune's real readers become aware that at least one advertiser knows that you don't buy the readership along with the circulation. It may take three insertions before the readers understand that someone is aiming in their direction, an informative, intelligent, soundly researched, stimulating message of specific advantage to them." This unintelligent use of an idea-carrier is typical of the advertising business--typical of fuzzy thinking in the communications area. This is really what we are talking about:- The acceptance as truth of what may not be truth and may simply be cliches, or the promotion of a particular sales gimmick on the part of the magazine. The communicator has got to look at the media in which he is going to place his message and say, "What is this medium? What does it do? Is it actually doing what it says it does? Are the people who are advertising or moving in this particular area actually thinking constructively and dynamically about it or are they easing along with the standard cliches? Let's advertise in Fortune magazine. What do we want to place in Fortune magazine? Well, we want a prestige ad. But what is a prestige ad? A prestige ad is an institutional ad; it is an image ad that says the company is great, the company is wonderful; an institutional advertisement has kind of a pompous, false, starched-front, stiff-necked attitude that really is of little interest to anyone except the president who is going to read it and say, "I read our ad." One of the new directions in which this corporation will need to go is the direction of innovation in its communication techniques:- The direction of persistent challenge to what is practice and what is traditional in the communication profession. To do this constructively it will take a good deal more than what one problem solver (Polyani) has called "lukewarm determination and sleepy consent to do a little something." The mathematician who is talking here says that "in the solution of very difficult problems, something more is needed than a little lukewarm enthusiasm and sleepy consent to do something." What he actually says is, "a lukewarm determination and a sleepy consent to do a little something may be enough for a routine problem, but to solve a serious scientific problem, willpower is needed that can outlast years of toil and bitter disappointment." This is true of any effort whether it is in scientific problem-solving or in communication problem-solving or in the development of communication programs. And the tendency to a little lukewarm determination to consent in a sleepy fashion, to say, "We'll do a little something here," is so standard a practice, and so easy for your young communicators to fall into, they must be warned against it. Challenge the tradition. Certainly in the modern era in which we exist, in the technological era in which new frontiers are being breached every day, challenge to tradition is getting to be pretty nearly a standard procedure. I don't see how you can go very far in communication, or in technology without the daring to challenge what has been said and done before. Not a foolish challenge or a silly or prideful one, but simply the questions:- "Has anybody every really looked at this? Why do you do it this way? Is this the right way to do it?" --"We don't know, we've always done it this way. It is right because it pays off." --"Could it pay off even more?" --"Well, don't ask such embarrassing questions."

Daring to think originally and radically is part of "the big black 'X' technique." The habit of rough and

and instant rejection of the pretensions, the custom sanction, the cliche and the easy; and the habit of instant acceptance of talent, brains, imagination, and style which--under professional direction, pay-off in dominance and in dollars. Your communicator has got to be told, and encouraged, to look at what has been done and to draw that big black "X" through it. Of course, he had better know what he is doing after he finishes the last downsweep, if he has obliterated something--he has to have something to replace it. If you reject the pretentious, if you reject the false, if you cultivate in the communicator the habit of rejecting the pretentious, the false, and the untrue--then you are making him think, you are forcing him to think because then he has sawed the limb off. He is on the edge of the precipice. He's got to come up with something to substitute for what he's thrown away. Rejection of it isn't enough, substitution of the better is the consequent action that hangs on this decision of his to draw the big, black "X." On the other hand, you must cultivate in him the feeling that as he goes through his career, and as he becomes a manager in this profession, that he must instantly accept without any qualifications, men with talent, with brains, imagination; he must take the communication, the advertising that is put in front of him or the layout or the design or the pattern--he must instantly recognize the good and the true and the radical and the brilliant regardless of what the practice is, regardless of what may be the smart and the tried thing to do. I believe the communicator must put himself in the position where he can use these wonderful tools, but they are tools that can cut him, as well as cut the job in front of him. I have a conviction about this--the communicator must put to honest use the tools that he has in his hands or they will turn and cut him. I have touched on this before--on intent and the content and character. I keep puzzling as to why is it that the communicator--of all professional people --is the one who has the obligation, the responsibility to seek for the truth, to seek the genuine, to seek the non-traditional, the new patterns. Now, it seems to me this is so because if he doesn't seek the truth, he is going to ruin himself; he is going to deny his own talent; he is going to dry up his talent; is going to cut off his ability to communicate, to think and create. Great importance is attached to readership rating by advertising agencies, media representatives, and clients. It is my conclusion that this numbers game does more to inhibit creative design and creative (that is, productive) writing than any other factor outside of sheer incompetence. The intuition of creative thinkers, designers, and writers in competition is a far more reliable guide to what is and what is not effective advertising than the statistically dubious findings of the ratings services. Clients who know where they are going and who employ top creative talent can afford to ignore, and do ignore, the dictates of TV, radio, and print media ratings. These are the same advertisers who instruct their advertising people to stay free of media domination through the agency commission system and to use the fee system--if that method will more fully and economically serve the client's purposes. These are the professionals who dare to use unorthodox media or to invent media or who are not bound by the conventional time-space-continuum. The whole purpose of the communicator is to seek the basic, the true idea; to be free of inhibiting and shackling influences; to re-assess and look again at every statement that is made about communication and the communication arts.

In industrial advertising as in image or consumer advertising, the system demands the writing of a master plan that outlines the problem and states the specific steps required to solve it. In addition to this, the study of all industrial media is absolutely required. Most industrial advertising is, as you know, characterized by exceeding dullness. It is only recently that trade and industrial advertising has begun to reflect some of the imaginative techniques used in top-grade national advertising. For years I wrote advertising for the industrial side of the U.S. Rubber Co. selling U.S. mechanical goods, conveyors, pipe, hose, and all sorts of ordinary stuff. Yet, I found that our work was extremely interesting when we used photographic techniques; when we went to the case histories of customer use of each of these products in terms of: What is the problem? What have been the consequences of not solving the problem? How can it be solved? And what are the benefits of a good solution? We were able, by using the photographic case history method, to bring these things to life; to make them valid and important to the buyer or consumer. I think the industrial, trade-advertising field--much neglected due to the glamour of national print and TV media advertising--is a tremendously important field particularly for the young communicator, the young generalist coming into advertising with his one skill of photography or of writing or of research or production--anxious to begin to work. Industrial or trade advertising might be characterized as the job in the basement that leads to the top. There is more freedom there; more tolerance. The beginner is not in competition (out of his class) with some of the top-level people we were talking about the other day; he isn't going to get his brains knocked out because he goofed on the first assignment. He has an opportunity in this field, as ball players do in the minor leagues, to make mistakes and to learn by his mistakes. At the same time, he can make a great contribution to a vastly neglected field of advertising and sales promotion. In my report to this very large, very solid company, which does a great deal of industrial advertising, I ask the questions:- 'Why is so much industrial advertising mediocre? Why would the same advertising agency produce advertising with such variation in quality?" This is almost like the caste system. In the advertising agency, X company you find the writers getting over $25,000 a year on the national accounts; and you find the beginners and the other fellows who aren't too good, writing on the industrial advertising account. (I am aware that the industrial advertising budget is smaller and the page-cost is less so the commission is less) Why is it that the reader-viewer is appealed to alternately as scholar and ass; idiot and wiseman; perceptive and dull? Why is it assumed that engineers and purchasing agents, managers and technicians who respond to "Dr. No" the motion picture, or "From Russia with Love" (a better picture I believe), "Tom Jones"; or who understand the intricacies of nuclear physics, computer programming; operations management, and financial put and call; why is it that these people, these engineers and purchasing agents who are responsive to these fairly sophisticated communication media--why do they think that they can be impressed with what I call "the gray cardboard" type of trade advertising. that makes up the bulk of industrial and professional media? This is one of the big question marks in the business. I really don't understand it. This is discrimination, this is segregation, of the worst sort and principally I think on a sort of a snob basis:- The big money is in the glamour stuff in the national media and therefore big commissions are being returned to the agency; and therefore the big money-men, copywriters, and art directors get put on the big money account. Well, this is logical in a certain money-grabbing, "we're-shrewd-businessmen" sense. On the other hand, if you are working for a company and you have got the total responsibility for handling the advertising, the problem is a problem. It doesn't pay to say--it isn't honest, it isn't professional to say, "The communicator is going to solve the big profit problem with a lot more intelligence and finesse than he will use to solve the low profit problem." To the communicator, to the creative man, the problem should be a problem just the same as it is to the scientist. He's got to have the same intense interest in problem-solving whether it is industrial advertising or whether it is financial advertising or image advertising. The point I would like to make is that there is a curious misconception here; this sort of "snobism" tends to blind advertising people and their clients to what the actual problem is, what the actual facts are. The purchasing agent who reads the industrial ads is the same fellow who gets a bang out of a CBS documentary. He is the same fellow who can see a motion picture like "Tom Jones" and see it three or four times and appreciate the many different levels on which it is written, directed, and acted. He is a fellow who can read a fairly difficult book, perhaps even PHYSICS AND PHILOSOPHY by Heisenberg. And he is the same fellow to whom again on TV, we show the simple smoke-signal type of commercial or on whom, in our industrial advertising, we inflict the really--if I may be vulgar about it--the damnedest sort of crumby layouts and low-grade thinking. There is a tremendous opportunity here for your people, your students. For example: The chemical industry, the electrical industry, the nuclear industry, many of the others--the automotive; take a real solid look at their trade advertising and if you don't see tremendous opportunities for your communicators--generalists or specialists--I will be willing to eat the whole year's output. I am sure that you will find this is so. I think you should look at these fields and ask, "Where are the opportunities for our people, our young people?" And by gosh, you'll find they are right in these areas where there are big round holes in the heads of the guys who for years have been doing the wrong and the dull and stupid things. If you took a stack of a whole year's subscription to one of these trade magazines and ran through the thousands of ads and thousands of pages, out of the whole bunch you might find five or six that jumped out and hit you. If you imagine yourself as a purchasing agent or an engineer, you'd have to consider the rest as a gray cardboard pulp--signifying nothing. The only conclusion you can come to is that somebody is wasting his money. So I say:- The man is the same; his emotions are the same; he doesn't switch his brain cartridge as he switches from one medium or one subject to another. His sensing apparatus is the same; his favorable and unfavorable responses are triggered, basically, by the same mechanism in a motion picture or on a television screen, as on a printed page. He doesn't--as purchasing agent or engineer--shed all of these intellectual and emotional and biological perception and feedback equipment the moment he is exposed to industrial ads. Therefore, his reaction must be annoyance, disgust--or indifference.

QUESTION: What really happened to General Dynamics? ANSWER: I thought we had gone into this a little bit, but I understand there is some question about time phasing that isn't clear and some conjecture as to whether it is the current advertising that we were talking about; whether the integrated design program is currently in existence or was this initiated--and concluded--before the fall. I would say that what we were discussing the other day in Miltonian terms "paradise" followed by the "fall." Really, if I might take a couple of minutes to set you straight on this, since there is some general question about it--the thing that we were talking about the other day was the GD Corporation in the upsurge of a tremendous growth period and the use that was made of communication as a factor in that growth. Of course, there were other factors. There was great engineering talent; there was great administrative talent; there was really shrewd financing--the manipulation of credits, the getting of loans and the instilling of confidence in the financial community; all sorts of personnel problems in the recruitment of top-level staff and recruitment of staff on down the line in the various disciplines; all of these factors in these areas of communication, of engineering, marketing, manufacturing, and operations that we talked about were brought into play in this complex and daring decision to go somewhere fast, to get somewhere very important. So, in consequence of all of these factors coming together--in which communication played a very powerful and integrating part--the company began to surge and to move; began to grow at an extraordinary and phenomenal rate. As such, it was pretty much like a shooting star, a meteor or a comet. It attracts a lot of attention and, of course, people are always wanting to bet on stars, race horses, or comets. So, many people withdrew their money from the more stodgy, blue-chip type of companies and they put their dough on GD. This meant a large investment in the company--for the general investing public. In consequence, the rise in stock price. Now, this tremendous upsurge reached its peak at the time of Hopkin's death--and probably went a little bit up from that peak afterwards. When Hopkins died, it meant a massive change of management. This is the sort of thing that every corporation undergoes and is not unanticipated, of course. At this point, a new management took charge. Due to a great number of factors--infinitely complex and varied as those I have just discussed--the corporation's surge was slowed. Its growth curves began to dive. Much of this was due to the enormous costs incurred in production of the 880 and 990 aircraft with which the Convair Division of the Corporation strove to make the transition from military jet aircraft to commercial jet aircraft against the competition of Lockheed, Boeing, and Douglas. This meant that the Convair Division had to learn many techniques and many forms of manufacturing, cost control, and engineering peculiar to commercial aircraft production--not parallel in production of military aircraft. Technical competence, of course, was there. Now, as this thing began to develop and the engineering changes began to take place which were necessary to the development of any new product and against the competition of Lockheed, Boeing, and Douglas, it became necessary to sell the airlines on advanced purchases of these machines. There was some question by the airlines as to the size of the aircraft and whether it would produce the payload and provide the range which these people always must look at as their basic economic factors; how many people, how many miles, how many dollars in operating costs, direct and indirect. So the effort to compress and refine and adjust the airplane to fit the requirements of the airline operators for most passengers, in least time, at lowest cost began also to multiply the cost of engineering changes. At the same time, there was that lag in internal communication previously mentioned. And this I propose as a theory; I don't want you to think of it as a fact; this is my theory. Other ex-insiders may have a similar or a different theory. There was, I suggest, a lag in communication between the division and the top corporate level; costs were being incurred beyond those even imagined by the central office; the feedback--the reporting--from the division was not in time for the central corporate office to make the necessary policy decisions in order to curtail or curb these expenditures or to find some means of financing them. So, we had the numerous aircraft engineering changes; we had the communication lag. Then later on, as aircraft began to come off the production line, we had the dramatic instance of Howard Hughes of TWA refusing to take delivery on his airplanes and at the same time refusing to let the Convair Division put them back into the production line for sale to someone else. He would have simply given up his position and could have come back in when he was ready to buy. And this was surrounded by all sorts of dramatic and mysterious stories:- The guarding of the airplanes by Hughes' men carrying shotguns and rifles and pistols; not permitting corporate officials to move the airplanes. This meant that the cash that could have been generated by the sale of these aircraft was not coming into the company. In consequence, there was a tremendous deceleration--a drop in income past the zero point to the big minus--the big debt point. I believe the figure was said to be around 400 million dollars. This dollar amount gets amplified as time goes by. Someone said the other day, "Now, how about the billion dollar loss that GD incurred?" Of course, this is one of the bad things about incurring losses. They always get bigger. A combination of factors plunged the company into the bathtub. This meant that really what was necessary was a complete reorganization of the company internally and the institution of a very cost-cutting campaign and, in addition, the most strenuous sales efforts in order to bring in new business. At this point, the TFX (Technical Fighter Experimental) with the variable sweep-wing configuration was called for by the Government. Boeing and GD were locked in an all-out struggle to get this contract. As many of you know, Boeing was chosen in each of three go-arounds by the Source Selection Group--but GD got the contract. Now why is another speculation. The Government is the Government and must consider many other factors, the airplane's cost and adaptability. The two common factors that seem to be at work here were the insistence of the Secretary of Defense that the airplanes submitted for the use of the three services have a high degree commonality. The Secretary apparently felt that the GD design had a higher degree of commonality than the Boeing design and that everybody had underestimated the cost. The acquisition of the TFX contract by GD was the turning point. It meant that GD had once again got hold of one of those surging forces that move a corporation up in sales volume and profits. Had GD not been awarded the TFX account, I suspect that there would have been a disaster. There would have been lost, a very powerful and effective production unit--not only to the airforce--but to the total economy of the country. When a government makes a decision, it must consider, I should think, the economy as a whole. It must consider the particular group which this product is supposed to serve; and it must consider the community and the economic factor of a distressed or non-distressed area. All these factors which a commercial outfit--say, Pan-American--buying from a company doesn't have to consider. The Government does have to consider it; and I would guess that these socio-economic-political factors also played a part in the choice of the company as well as the excellence of the design. In any event, at this time also, there came into the company a new corporate head--Roger Lewis--who was formerly executive vice-president of Pan-American, had been Under Secretary of Air for the U.S.A. Defense Department and had also production experience at Canadair, Ltd. before it was acquired by GD. His task was to begin to produce the TFX and other products of the company--submarines, notably--at the very lowest possible cost to the company as well as the lowest cost to the customer. This meant revamping the internal organization; it meant cutting of all costs to the bone; and among those cuts to the bone, were advertising and promotion. The public relations program virtually ceased to exist. There was no advertising for a period of at least three years. GD is now beginning to advertise again concurrently with the increase in sales and the increase in profit. The corporation has gotten rid of the burden of this $400 million debt. It is now in the black and are beginning to show a good profit. The come-back of GD is a very tremendous achievement. Lewis came into a company that had been, and to some extent still was, a great name; a company that had done great and sensational things in many fields; that had developed an identity program of extraordinary capability and fruitful result. But when Lewis came into GD, it was a company from which all the bloom had been taken, all the luxuriant growth had been stripped off. He was given the job of taking this almost dead tree and bringing it into flower again. I don't think anyone should minimize this man's accomplishments. If you look with admiration at the glamourous rise of Hopkins, you should also understand the tremendous effort that this man and his associates--including a few of the original Hopkins staff and most of the operations people--have made to revitalize this company despite the almost total inhibition of promotion, advertising, and public relations spending. Now GD is on the rise again. Whether they will ever again go to the type of corporation that the founder of the company had envisioned, I doubt. I would guess that GD today is an entirely different company. The corporate entity has survived, but there has been almost like a personality change, a transformation, as if in human terms, a man had gone through a devastating experience and has needed to change his whole attitude in order to live. The corporation has survived; the corporation exists. And this is the main point--the corporation must survive. Men come and men go; the corporation remains. So here we have the fellows at GD back on the up-swing again, but this time there is not so much of the full, glamourous spectacular range of mind and thought and imagination; they are much more practically dedicated to the service of the country through the development of weapons systems. The atomic energy division is still in being, still headed by the still-young man who moved into it under Hopkin's guidance, Fred deHoffmann; the division is building nuclear reactors for huge electrical utilities for the generation of electrical power. As you know, nuclear energy for electric power generation is very much the coming thing. After a long period of dryness, and somewhat longer than anybody had pictured, the cost-per-kilowatt is coming down to the point where nuclear power is competitive with coal in areas such as New England and along the West Coast. Now, I believe, it is to the point of where in a new installation in New Jersey (by General Electric), the cost is below that of coal. So we might anticipate that GD will continue to be a weapons system manufacturer and will continue to be one of the pioneers in the development of electrical power through nuclear energy. I hope that this has been a fairly clear exposition of the coproration. Any one person's point of view must, however, be an approximation and may be only a part of the truth. It seems to me that in looking at these events you must always look as impersonally as possible; not look for bad guys in black hats. The situation is in command, obstacles must be overcome and there are varying degrees of success in overcoming them. I don't think that very many people in industry are purposely bad; they sometimes do bad things because they don't know any better; and they sometimes do wrong things because they are caught in a situation where there isn't much choice. So much for General Dynamics Corporation.

I was anxious to get on a little bit--

to get beyond some of the general discussion--to revert to the boilermaker who has now become a nuclear energy man. One of the problems in this company--again thinking in terms of the human analogy, the company--if you can picture it--was the boilermaker who suddenly found out that what he was producing wasn't good enough to meet his modern competition and then had to change his personality (not in the same sense that GD changed but better, because he is in advance of it); he had to become a nuclear power producer as well as the old boiler manufacturer. And then he had to indicate to his customers that he was "with" the new technology. The point that we are trying to make here is that the old attitudes, the old techniques, the old patterns that had come out of the coal-and-iron-boiler-making-technology had impressed the themselves on the communication aspects of this company so that divisions were not tightly locked together. There was very little internal communication of any consequence. External communication, from the standpoint of trade advertising (with few exceptions) has succumbed to the general "gray cardboard" environment. And the national advertising had never really gotten away from the type of bland and "say-nothing" generalization so characteristic of the institutional advertising--image advertising--of corporations who really do not understand the power and the impact of a correctly used communication program. The recommendations made to this company were very specifically stated. They were concerned with increasing the impact of national advertising through the use of modern communication technology; the stepping up of the trade advertising by elevating it with the national advertising and having the daring to say, "Let's throw this stuff out the window; let's draw a big black "X" through what was done before; and let's try again." With respect to internal communication, the recommendation was, specifically:- To develop the type of Communication Committee that we have been talking about; to begin to integrate all the divisions (that is, have representation of each division on the central company headquarters Communication Committee); and then to begin to amplify communication between the chief executive officer and his staff and between members of the staff, the top corporate policy level and the divisions. Part of the problem-solving task, and prior to these recommendations, was intensive interviewing of almost all of the company's leading executives and many of their top production managers. Along the lines indicated, -- "What is it you are doing? What is your department headed for? What are your three, five, and ten year objectives?" Out of this came the basis for many of the recommendations that were made. These were not off the top of the head; they were not pulled out of books; they came out of a real, hard-slogging type of--if you want to think of it in the terms of some modern magazine article-preparation technique--researcher-writer-interviewer technique. In this case, researcher-writer in one person. The lesson to be learned here, I think, is that you have to go into solving these problems--you have to go after the facts--yourself. You can't take anyone's word for it; you can't merely read corporate literature. You have to go around and ask, What are you doing? Is this what's happening? and the guy says, "No, that isn't what is happening." So out of this on-the-scene research come the recommendations you make. That's why they are startling, upsetting, seem to be radical, and don't gain you too much of an audience with the people who have asked you to tell them what the facts are. This brings us back again to one of the questions asked by a member of the group, What about the idea man in business? What happens to him? He isn't very well-respected in the educational field; what happens in business? What happens in business is exactly the same thing that happens in education: The new idea, the bomb that gets dropped is not always welcome. You have to fight the idea through; you have to continue with courage; you have to not try to fake it, not to make it too soft, but, of course, always have to be polite and gentlemanly, without being a boy scout. And you have to give them the bad news. One of the soundest admonitions of our friend, Boulware, to the General Electric people was, "Give me the bad news first." This is quite at variance with most executive procedure. Most of these fellows come to their offices in the morning wanting to know only the good news--but not Boulware. Of course, he didn't conform much to anything. He wanted to know the worst so he could do something about it. "Give me the bad news first. I want to find out where the trouble is so I can fix it." His feeling was that the good news would pretty much take care of itself. The bad news was what was going to hit him in the neck when he wasn't looking, so he went out and got it--first. His non-conforming practices occasionally couldn't do him much good. He treated rather lightly the tradition of the GE man. He didn't feel that the GE monogram had been burned into his forehead and he would make such comments as, "You know, I will never be a GE man." Here he was, a vice-president in charge of one of the chief services of the company and he would make this remark before management groups. Of course, their question would be, "Why do you say that, Lem?" "Well," he would say, "I have only been here thirteen years and I am due to retire in two years--and it takes twenty years to make a GE man." This was not regarded as very funny by most GE management people. He was ridiculing, burlesquing a management cliche, the stuffy, silly idea that it takes twenty years to make a GE man. One of the problems of internal communication is:- How do you get these set ideas broken up--phoney ideas that make business snobs, false and pompous ideas that block creative effort. I would like to discuss, if I may, a couple of things about General Electric with respect to internal communication. Having indicated that the boilermaking outfit had an awful lot of things to do in every line of communication, I must report to you as an honest communication man, that they have not yet done them. I put in the word "yet" with some expectation that they will do them simply because they must. There is no personal criticism implied. It isn't a question of personalities. This, again, is the communication man at work in the case-solving area which is, in essence, what your people, your students, are going to do. The communication man must state the problem to himself or others; he must fractionate the problem; he must get the data; he must make his analysis of that; he must make his recommendations; and then he must let it ride. Whether the management or client acts on it or not--a matter of great personal grief if they don't--but whether they act on it or not, he must leave to them. This is much more so in the case of the consultant than it is in the case of the young communicator. Yet, these are basic principles of action, reaction, attitude and philosophy that I think that you need to inculcate if the student is to enter the business environment and be successful in it.

General Electric, in consequence of the strike threat which we discussed before briefly, needed immediately to go about the problem of solving why people walked off the job when their managers said, "My people will never walk out on me." What happened here? What actually happened was a basic failure in communication, complicated by the fact the managers--the company did not know really--did not have any feedback or information devices to tell them--what their employees were thinking, in time to take corrective action. The feeling of "I know my people. I know that I am really not a popular fellow, but still my men respect me and they won't walk off the job" is almost always an erroneous feeling. It was so demonstrated at GE. But it persists in many areas of industry. The questions are not How do you feel? What do you believe? but What are the Facts? What is the problem? What do you really know? and What do you know, as of today? What you know as of today is really no longer up to date. With electronic technology coming in, it is almost What do you know up to this second? The wonderful advantage of modern computerized networks, and the new type of amplified communications systems, is that you don't have to wait days, weeks, or months for vital information. You are updated, literally, almost to the minute. Inputs from the various divisions are collated, analyzed, displayed or reproduced and recorded at electronic speed. The chief executive officer can find out daily what is happening now; and this means that the heads of various divisions and functions can find out what is happening on an hourly basis. As at General Dynamics, the General Electric top management didn't know what was happening and in consequence, they had to take the strike. As a result, GE adopted the intelligent attitude, "If we didn't know what was happening before and we had this near disaster, let's make very sure that it isn't going to happen again. Let's get more information from the employees; and let's get more information to the employees." This is a good solid engineering approach. Many of these factors that later came together in a comprehensive internal communication program, of course, had already been in existence, but under the compulsion to solve a problem of catastrophic dimension, they got integrated under a general head of Internal Communication Techniques of Leadership. The GE management saw the problem, in general, as having three areas:- One, motivating the management team (that is, the top management team); two, developing supervisors as leaders (this meant the first line of supervision); and three, building confindence in the management (that meant building employee confidence in the management; that is, the general mass of employees). It is interesting, I think, that the GE management saw the problem not in terms of communication, really--except for the professionals, as we think of it in terms of communication--but in terms of leadership. One of the basic practices of GE's management is the development of leaders. This means the development of people who not only know how things are done, but who are able to attract to them other people who know how things are done; and to instill into the people who represent the bulk and mass of the employees, the dedication and a loyalty toward the objectives of the company which the manager himself has--and which may not be assumed, without great hazard, that the rest of the employees had. So the question of leadership--that is, Who is the man to whom people look? the man people imitate, emulate?--the question of leadership was paramount at GE. A communication program was a method of building the type of leadership, building the type of motivation, and building the type of confidence they wanted. The kind of confidence that would pay off not only in no national strike, no local strike, but the kind of employee motivation and confidence that would result in less waste and spoilage, less absenteeism, more productivity--on a voluntary basis rather than on a forced basis. In general, these objectives and functions were put together by the Employee Relations staff--the group headed up by Boulware in which I was the communication manager--they were put together in two books:- EMPLOYEE COMMUNICATION and THE GE NEWS.

THE GE NEWS was a very specifically directed and highly skilled type of communication device; the general employee communication program also became so. And because of the extraordinary complexity, diversity and number of these programs, I think it well worthwhile to give you a very brief synopsis of them and if, after the period is over, you have any further questions I shall be glad to be available to answer. Although the GE programs we are discussing are a good many years old now, I find it interesting that--as I go about among various companies--there isn't a single company I have gone into (and there have been some large ones) that has now as comprehensive an internal communication program as GE had at that time--years ago. Whether GE today has such a program, in this depth, I don't know. I would guess that they do have and that it is far better than it was before. The basics of this internal communications program and the tremendous opportunities presented, through this sort of program, to communicators--whether generalists or specialists--are pertinent to our case. At GE, we published these books. They became our guidebooks and the guidebooks for managers throughout the entire company. Here in the opening pages of EMPLOYEE COMMUNICATION is a very good definition of communication:- "Communication is, in a sense, synonymous with human relations, since all personal relationships are developed through some form of communication. It is through our communication program, therefore, that we must work to develop the positive attitudes, the loyalties, the respect for management, and the teamwork so essential for profitable operation. Yet we must always remember that no amount of gadgetry or going through the motions will get results. The techniques of communication are merely tools by which the dynamic leader makes his wishes felt through a large organization. Given such leadership, his techniques will stimulate spontaneous initiative at all levels, clearing away the obstacles which stand in the way of achieving the goals which management has established for the unit." The techniques of what we called "intensive communication" were put to work in three major areas: Motivating the management team; developing the supervisor-leader; and building employee confidence in top management. After stating these general principles, then, it was necessary to follow up with action in the specific areas in which they might be effective; the areas in which intensive communication could bring higher operating efficiency and greater profitability. The purpose of a business corporation--under its charter --is to make a profit. If it doesn't make a profit, it gets into the perilous position in which GD found itself; it ceases to be true to its reason for being. There has been a great deal of nonsense written about profits and profitability and sharing profits and gross profits and all that sort of thing, but if your young communicators will look carefully at the facts of the profit picture, they will see that the very worst thing a company can do--socially, economically, ethically--is to fail to be a profitable enterprise. There were specific areas in which General Electric sought to get improvement. These were:- Average weekly dollar output per employee, direct labor hours per unit, waste and spoilage, absenteeism, voluntary labor turnover, and accident frequency. These were all vital parts of the corporation which contribute to making a profit or which contribute to diminishing a profit or could contribute to the minus figure, the red figure, the loss. Through the use of intensive communication techniques, GE was able to reduce absenteeism, to reduce turnover, to reduce accident frequency, to reduce spoilage and waste by twenty-five to thirty percent. This meant that, over a four or five year period, profitable income was greatly increased. The reduction of these drains on the corporate economy are equivalent to tremendous gains of new business of a highly profitable character. The experience of GE shows that a higher degree of integration and motivation among the members of the management team can produce significant and often startling results with respect to profitability. Significant, startling results in those hard areas of waste and spoilage, and turnover, and absenteeism which diminish the profit picture. These are some of the factors or techniques or media used by top managers in attempting to motivate his team not only to understand the objectives of the company, but then to transmit them to the organization below him:- Camp meetings; dinner meetings; auditorium meetings; staff meetings at all levels; emergency meetings; management and informative conferences; supervisors "vestibule" courses; supervisors handbooks; education and business principles; developing closer personal relationships; personal progress reviews; department newsletters for supervisors; and booklets for supervisors. Sounds like a lot of media--it is. And it is a lot of work, too. The point is that the overriding drive here is so enormously important, so tremendously compulsive that almost every medium that one can think of must be employed to determine whether the right motivations for the top management team can be developed. Many of these that I have mentioned became minor factors and a few stood out very clearly. For example, the management informative conference in which the manager held periodic meetings--some managers held them every Monday morning, some every morning at seven-thirty. At the daily meetings, the top management people met to review what happened yesterday and to analyze specific and critical problems that had come up. These men got the critical problems solved before the day began. This may seem like an extraordinary effort. But these men were dedicated to the proposition that full, frequent, and free communication is the way to begin to lick the problems of motivation and communication. If the problem isn't stated, if it isn't brought out, if it isn't hammered out and the solutions aren't made, agreement achieved, then there isn't going to be any result or else the result is going to be a bad one. Now, any one of the basic factors in running these meetings, from a communication standpoint is the constant problem of understanding, of not understanding, and of misunderstanding. The objective is to keep the group there in the manager's office until everybody really agrees they understand--even if the problem and the agreed-on solution have to be stated and restated. If problem and solution are not understood and have to be explained again and again--this is still all right with the manager; he is perfectly willing to go to the trouble of doing it again. The danger the manager seeks to avoid is having a member say, "You bet I understand it," when he doesn't not only understand it, but really misunderstands it and goes out and acts on the basis of his misunderstanding. Then all sorts of damage happens to the organism; this essentially biological organism. This does occur. I know that this occurs in a corporation for whom I have done some work. For instance, the president holds a meeting of the chief executive council, states something, restates it and then says, "Well, gentlemen, that is all. Let's get going." And the twenty-three men in the meeting fan out in twenty-three directions, with twenty-three different ideas of what the president has said and twenty-three different ways of doing it. What has happened here is that there was not enough of a reprise or coming around again so that it was possible to say which of the group really does understand, which doesn't understand, and which misunderstands. This occurs presently in many corporations at very high management levels. I recall--as you must also--one of the old experiments in psychology at Harvard in 1910 or 1913 where the pioneer psychologist says to his class, "Gentlemen, today we will discuss - - - ." And at this moment a fellow enters the back of the room, fires a gun three times and runs through the room and out the front door. When things have quieted down, the professor says, "This was an experiment. Please write down what you saw and what you heard." There were almost as many stories of what happened as there were members in class. This is a classic as you all know, but the principle persists. Executives who have read the psychology books are still not on guard. This is the interesting thing about communication; some of these problems of human behavior have been studied for more than fifty years, they are still pertinent to human communication today. Either people don't apply what they have learned or there is new growth coming up and they have to be acquainted with these fundamentals, told and taught all over again. This is why your task--the teacher's task--is never going to end. So, there is the "pistol shot" in the modern executive conference room. The chief executive says, "Our program and policy on new machinery for the agricultural field is - - - ." At the end of that explanation, there are twenty-three different versions of what he really said and twenty-three different actions taken. It does seem incredible but it is so; and that is why you will be in the communication business for a long time.

Now, in addition to the motivating of the management team which I have skimmed over very quickly--I am talking merely about the media of the techniques of it rather than the essentials --we have the problem of developing supervisors as the real leaders of the people. At the time I was at GE, there were at least 125,000 employees. These employees were fitted into the organization by divisions, and sections and manufacturing units and groups within functions. But what it came down to really, in respect of management and communication, was the first line supervisor. The man who had under him any where from ten to twenty people, the first line of supervisor, became Mr. Management to his people. Their relationship to him was, of course, far closer than to anyone else; and to them he represented the company. One of GE's problems in their strike was that the first line supervisor had not been effectively used as the conveyor of management policy to the employees and as the conveyor of employee attitudes and problems and dissatisfactions to the management. One of the basic objectives of the employee communication program was the development of the supervisor as the real leader of his people; the man who was really Mr. GE. In this effort, the media used were: Round-table conferences; work-place meetings; developing personal relationships; initial contacts with new employees; rating interviews; counseling; grievances; exhibits; bulletin boards; suggestion boxes. All of these things were really managed by the first line supervisor in addition to doing his other basic tasks. This man became the principal factor in the entire internal communications effort of the company. The ability of the individual supervisor to achieve real leadership of his group is the prime factor in attaining good employee relations, in developing favorable attitudes among the employees and in enlisting their cooperation in waste and spoilage reduction, the higher productivity, better quality, and safer operations.

At GE there was the division manager, the remote Mr. Big, then there was the plant manager, and then the supervisors. Now, the plant manager worked very closely with his supervisors and attempted to develop them as the leaders. In doing some further research in attitude and motivation studies we discovered that there were, also, informal leaders throughout the organization. Of course, this is well-known now, but these were discoveries that were first being made at that time. These informal leaders, we found, were just as powerful and often more powerful than many of the formal leaders. We often wondered where various inputs were coming from and why certain groups of employees were acting in a certain way and why sometimes what seemed to be a developing crisis was suddenly smoothed over; no longer was a problem. Some of the people in the employee relations group began to investigate this sort of a thing. They found that informal leaders can exist right in the top manager's office or on the supervisor's staff (not the supervisor). The informal leader may be the assistant to the supervisor; or there may be way down in the group reporting to the supervisor, a fellow not noted for doing anything very great, just an average guy, but a man to whom the rest of the employees turn on an informal basis for advice, for leadership. Employees sometimes tell the boss some things they think he ought to know and that top management ought to know, but very often they bring the real problems, the tough problems to the fellow you may think is the most "non-eminent" of the group. One of the supervisor's jobs is to find out who the informal leaders are; and he must cooperate with them because if he bucks them or runs against them, he is through. He is through in the sense, not that he is out of a job, but that he isn't getting the inputs, he isn't getting the communication that makes him the leader that it says on the chart that he should be. In one plant there was a great deal of trouble, but suddenly it smoothed out. Management tried to find out where the controlling input was coming from. It wasn't coming from here or here (showing diagram on board) and it wasn't coming from here either. It was coming from out here, beyond the plant area. There was a bar and grill located about three miles outside the plant gate and what had happened was that some of the supervisors and some of the employees frequented this place--this problem-solving locale--and in here, behind the bar was a man who seemed to possess all sorts of basic wisdom. He didn't know the details of any plant operations, but he knew human relations and he had a basically wise attitude, a basically sage attitude toward human beings, organizations, and problems. Someone I was describing this to the other day said, "Of course, a typical bartender." He is right. Many bartenders are very wise; they almost have to be because they have so much to do with human nature--"Nobody ever brings a little problem to a bar." Well, anyhow, they came to the informal leader and they said to him, "Joe, we've got a blank-blank of a problem up at the plant. What about it? What do you think about it? And this guy, wiping the bar and sliding the beers down and putting the shots out would say, "Well, I don't know, fellows, but it looks to me like you ought to - - -." They would talk this over and almost always the bartender's comments were wise and to the point and in their best interest. So the investigating team tiptoed out of the bar and away from the whole area and left this man alone. Because, as Heisenberg points out in his discussion of quantum theory, the intrusion of the observer distorts the data.

Let me summarize:- The informal leader (communicator) is fully as important as the man who has the responsibility on the management chart. If you don't find him and cultivate him, then you are neglecting one of the most important components in the communication network. Employees know, of course, that basic decisions affecting their work and their welfare are made by management at the higher levels. Studies in employee attitudes indicate that most employees distinquish between the supervisor and the company and that their feelings toward them differ. No matter how respected a supervisor may be, employees still need reassurance that at upper levels there is some sincere interest in their welfare. Top management must, therefore, maintain its own direct contacts with employee groups and give all employees the opportunity to see and hear from them from time to time. One of the most productive media that we found in General Electric was the "rumor clinic." You may be well aware of it; I will simply rehearse it for you briefly. The manager of a plant calls together each month all of his first line supervisors and any of the selected employees that those supervisors want to bring. He says, "I am now going to be standing up here in front of you for three hours. I want to hear from you every single rumor that you have heard about this company, about me, about this plant, about your supervisors and about your section managers; and I want to know it all. Some of you have submitted rumors in writing and I will start the meeting by reading off these questions: Is it true that GE is engaged in price-fixing?" Now, if you are the manager, what do you do? You have heard about this; you know that maybe it exists; so, if this is your conviction, you say, "This is not so. It is against the law, and it is against the directive of the chief executive officer, the president. This is a rumor. It is not a fact, and I scotch it for you now and I tell you it isn't true." Now the guys are saying to each other on the side, "That's a lot of bunk. We know the guy that's doing it." So you know that is what they think and you may have to say, "Men--I know this is on your mind and it is on my mind too, and I don't know the answer to it but I am damn well going to find out and I will give you the answer at our next meeting." Worse, the manager may run into the problem of, "Is it true that you're going to lay off 500 men in Department A before Christmas?" And he says, "That is an absolute lie. I will guarantee to you as I stand here as your manager that this is not going to happen." Well, the manager is in a really tough position because somewhere up the line some genius at the top level may have said, "You know, the way to solve our problem here, with orders dropping, is to lay off about 5000 men through various departments of the company. And the time to do it is just before Christmas, so - - - ." The point, however, is that despite the occasional cross-ups, this incessant feedback in communication between employees and the manager who had the guts and the brains to stand up there and take this sort of thing, smoothed out bad situations, cooled them, killed off the rumors. What we did was to take the results of these rumor clinics--the rumors and the answers --and put them into a "Rumor Clinic" or "Grapevine" feature of "The General Electric News," distributed weekly to all employees. We plugged these holes in the communication net at the general level in the written publications as well as in the supervisor's and manager's meeting. And I will say this for GE-- the managers did not dodge the very difficult questions. There were some questions affecting company security that they could not discuss, but in general, they were frank and free and open about it. It was one of the management techniques that paid off because it was based on head, hand, and heart communication. The medium merely happened to be the rumor clinic.